In the Supreme Court
of the United States.

OCTOBER TERM, 1905.

THE STATE OF KANSAS, *Complainant*,
vs.
THE STATE OF COLORADO *et al.*,
Defendants.
THE UNITED STATES OF AMERICA,
Intervenor.
} No. 7, Original.

BRIEF OF COMPLAINANT ON FINAL HEARING.

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I.
STATEMENT OF THE CASE.

SECTION 1. The Parties to the Action.

The legislature of Kansas in the year 1901 adopted a concurrent resolution, being chapter 425 of the Laws of Kansas, 1901, which reads as follows:

"Senate Concurrent Resolution No. 14.

"*Relating to the diversion of the waters of the Arkansas river, in the State of Colorado, as follows:*

"Whereas, It is a matter of common notoriety that the waters of the Arkansas river for some time past have been and are now being diverted from their natural channel by the state of Colorado and its citizens, to the

great damage of the state of Kansas and its inhabitants; and

"WHEREAS, It is threatened not only to continue, but also to increase said diversion: therefore, be it

"*Resolved by the Senate*, the House of Representatives concurring therein, That the attorney-general be requested to institute such legal proceedings, and to render such assistance in other proceedings brought for the same purpose, as may be necessary to protect the rights and interests of the state of Kansas and the citizens and property owners thereof." (469.)

Pursuant to this resolution, and by the authority of the governor of Kansas, leave of court first being granted, The State of Kansas filed its bill in equity on the 20th day of May, 1901, naming The State of Colorado as defendant (6). Due service of process was made, and upon the 15th day of October, 1901, The State of Colorado filed its demurrer to the bill of complaint (23). This demurrer was argued before the court on the 24th and 25th days of February, 1902, and on the 7th day of April, 1902, the demurrer was overruled, without prejudice to any question, and leave was granted to file answer, the opinion of the court being found in 185 U. S. 125 (29). On the 3d day of November, 1902, The State of Colorado filed its answer to the bill of complaint (46). On the 17th day of August, 1903, leave of court first being granted, the complainant filed its amended bill in equity, naming as defendants therein The State of Colorado; The Bessemer Ditch Company, a corporation; The Oxford Farmers' Ditch Company, a corporation; The Otero Canal Company, a corporation; The Lake Canal Company, a corporation; The Riverside Ditch Company, a corporation; The Catlin Consolidated Canal Company, a corporation; The Graham Ditch Company, a corporation; The Lamar Land and Canal Company, a corporation; The Amity Canal and Reservoir Company, a corpora-

tion; The Rocky Ford Canal, Reservoir, Land, Loan and Trust Company, a corporation; The Fort Lyon Canal Company, a corporation; The Colorado Land and Canal Company, a corporation; The Great Plains Water Company, a corporation; The Arkansas Valley Sugar Beet and Irrigated Land Company, a corporation; The Colorado Fuel and Iron Company, a corporation; and The Bent-Otero Improvement Company, a corporation (62).

Of these defendants the following have filed answer herein: The State of Colorado (79), The Graham Ditch Company (101), The Arkansas Valley Sugar Beet and Irrigated Land Company (125), The Fort Lyon Canal Company (153), The Rocky Ford Canal, Reservoir, Land, Loan and Trust Company, The Catlin Consolidated Canal Company, The Oxford Farmers' Ditch Company, The Laguna Canal Company (163), and the Colorado Fuel and Iron Company (190).

The following defendants were served with process but have not filed answer: The Bessemer Ditch Company, The Lamar Land and Canal Company, The Riverside Ditch Company, and the Bent-Otero Improvement Company (77).

The following defendants were not served with process and have entered no appearance: The Otero Canal Company, The Amity Canal and Reservoir Company, The Colorado Land and Canal Company, and The Great Plains Water Company (78).

On the 21st day of March, 1904, leave of court first being granted, the United States of America filed in this case its petition of intervention (235).

To these adverse pleadings the complainant filed its general replication.

On the 14th day of March, 1904, the defendants The Arkansas Valley Sugar Beet and Irrigated Land Company, The Graham Ditch Company, The Colorado Fuel

and Iron Company, The Fort Lyon Canal Company, The Rocky Ford Canal, Reservoir, Land, Loan and Trust Company, The Catlin Consolidated Canal Company, The Oxford Farmers' Ditch Company and The Lake Canal Company filed their joint and several motion in the case to dismiss the bill and all proceedings against said defendants (231). On the 16th day of May, 1904, the consideration of the motion to dismiss was, by order of court, postponed until a hearing of the cause on its merits (243).

On the 16th day of May, 1904, an order was entered of record appointing Granville A. Richardson, of Roswell, N. M., commissioner to take evidence in this action; and on the 29th day of November, 1904, a further order was entered that the parties to the action be allowed to prepare an abstract of the evidence taken, and to print the abstract in lieu of printing the original evidence, and to file the original evidence without printing the same (244.)

SEC. 2. The Issues Joined.

The bill of complaint alleges that the state of Kansas was admitted into the Union on January 29, 1861, that the state of Colorado was admitted on August 1, 1876, and that the other defendants are corporations organized, chartered and doing business in the state of Colorado. That the Arkansas river rises in the Rocky Mountains, in the state of Colorado, and, flowing in a southeasterly direction for a distance of about 280 miles, crosses the boundary into the state of Kansas. That the river then flows in an easterly and southeasterly direction through the state of Kansas for a distance of about 300 miles, then through Oklahoma, Indian Territory, and Arkansas, on its way to the sea. Through the state of Kansas the Arkansas valley is a level plain but a few feet above the normal level of the river, and

is from two to twenty-five miles in width. Back to the foot-hills on either side there are bottom lands which are saturated and subirrigated by the underflow from the river, and are fertile and productive almost beyond comparison. The Arkansas river is a meandered stream through the state of Kansas, and under the laws and departmental rules and regulations of the United States it is a navigable river through the state of Kansas, and was, in fact, navigable and navigated from the city of Wichita south to its mouth; and that the complainant is the owner of the bed of the stream between the meandered lines, in trust for the people of the state. That the complainant is the owner of two tracts of land bordering upon the river, one at Hutchinson and one at Dodge City, upon which state institutions are maintained—one as a reform school and the other as a soldiers' home. That when the state of Kansas was admitted into the Union it became the owner for school purposes of sections 16 and 36 of each congressional township, of which the complainant still owns many thousand acres, much of which borders on the Arkansas river. That by act of Congress of March 3, 1863, the complainant became the owner of each odd-numbered section of land in the Arkansas valley, and has since conveyed the whole of this land for the purposes specified. That by the year 1868 the land in the Arkansas valley began to be taken by actual settlers, and by the year 1875 practically all the bottom lands in the east or lower half of the valley were entered and settled, and title obtained from the United States or the state of Kansas; and by the year 1882 the west or upper half of the valley was so entered and settled and like titles obtained. By the year 1873 a railroad was built through the entire length of the valley, and immediately after their settlement these bottom lands were extensively cultivated, large crops of agricultural products were raised, towns and cities sprang

up, population rapidly increased, and by the year 1883 practically all the bottom lands of the Arkansas valley were in a state of successful and prosperous cultivation; that the waters of the Arkansas river furnished the foundation for this prosperity. These waters furnished a wholesome and ample supply for domestic purposes, for the watering of stock, for power for operating mills and factories, for saturating and sub-irrigating the bottom lands back to the uplands on either side of the river, so that crops thereon were not only bounteous but practically certain, and in the western portion of the valley these waters were appropriated and used for surface irrigation, to supplement the scanty rainfall in that region. That by reason of these uses of the waters of the Arkansas river, and the almost unvarying water-level beneath these bottom lands being near the surface, the lands in the Arkansas valley in the state of Kansas were of great and permanent value to the owners and settlers thereon, and those upon the tax-rolls of the state of Kansas yielded a large and increasing revenue to the complainant for state purposes.

That after the lands in the Arkansas valley had been settled and raised to a high state of cultivation, all the bottom lands in the valley being riparian lands and directly affected by the presence and flow of the river, and after parts of the flow of the river had been used for manufacturing and milling purposes, and after the riparian lands had been largely and extensively irrigated in the valley of the river in the western portion of Kansas, and after portions of the land so belonging to the complainant had been sold and conveyed, the state of Colorado and other defendants began systematically appropriating and diverting the waters of the Arkansas river, in the state of Colorado, between Canon City and the Kansas state line, for the purpose of irrigating dry, barren, arid, non-riparian and non-saturated lands lying

on either side of the river, and often many miles therefrom, and by the year 1891 all the natural and normal waters and a large portion of the flood-waters of the Arkansas river were so appropriated and diverted and actually applied to these dry, barren, arid, non-riparian and non-saturated lands in the state of Colorado, said diversions increasing from year to year, as their means of diversion became more complete and perfect, so the average flow of the river was greatly and permanently diminished and the normal flow of the river, exclusive of floods, was wholly and permanently destroyed, the navigability of the river where navigable before has been ruined, the power for manufacturing purposes greatly diminished, the surface of the underflow beneath the bottom lands has been lowered about five feet, and the water for the irrigation ditches in the western part of Kansas has been entirely cut off. The loss sustained by the complainant and its citizens has been great and incalculable. The benefits of river navigation are gone; the cheap water power has been replaced by the costly steam power; the productiveness and value of the bottom lands have been greatly diminished; the irrigation ditches are left dry and the lands uncultivated, and the revenues of the state of Kansas and its municipalities have been materially decreased. Against this loss and injury the complainant prays the assistance of this court.

To these allegations of the bill of complaint the state of Colorado, as the principal defendant, filed the negative defense of a general denial, and the affirmative defense that, as the waters of the Arkansas river fall either in snow or rain within the boundaries of that state, the state of Colorado, by reason of her sovereignty, her constitution, her laws, her customs, and her needs, is the owner of all these waters, and has the right to control and divert the same as long as those waters or any of

them remain within the state lines; that by reason of said ownership, control, diversion and application great property interests have grown up within her borders, and her prosperity has been greatly augmented. The defendant admits that the waters of the Arkansas river are extensively diverted in the state of Colorado for the purposes of irrigation, but denies that they are taken out of the drainage area of the Arkansas river, and denies that the diversion of the waters in the state of Colorado has decreased the flow of the river in the state of Kansas. The defendant alleges that by necessity, common consent and uniform practice it has diverted the waters of the Arkansas river in the state of Colorado, and has the right so to do, and that the appropriations so made in Colorado are prior to the uses made of them in Kansas. The defendant further alleges that under the laws of the United States and the state of Colorado they have the right so to appropriate and divert the waters of the Arkansas river, regardless of the rights and interests of the state of Kansas and its inhabitants.

The defendant the Colorado Fuel and Iron Company, after repeating many of the defenses of the state of Colorado, further denies that it diverts any water from the Arkansas river for the purposes of irrigation.

The defendant the Graham Ditch Company, after repeating many of the defenses of the state of Colorado, further affirms that the lands irrigated by its ditch are riparian lands and that it has equal rights with riparian proprietors in Kansas.

The defenses set up by the other defendants are substantially the same as those of the state of Colorado.

The government of the United States, by its petition of intervention, alleges that it now owns many thousand acres of land in the Arkansas valley, and within the drainage area of the Arkansas river, both in the state of Kansas and in the state of Colorado, and that it is

interested in the result of this action. It alleges as a defense to the bill of complaint filed on behalf of the state of Kansas that the doctrine of riparian rights does not extend to the lands situate in the arid regions where crops can be raised only by irrigation. It also alleges, in defense to the affirmative answers filed by the defendants, that the state of Colorado and the other defendants have no right by reason of the constitution, laws or sovereignty of the state of Colorado to own, control or divert the waters of an interstate stream, and affirmatively alleges that the flood and other waters of interstate streams should be conserved and impounded in the arid regions in reservoirs constructed for that purpose, and used in the reclamation of arid lands in the order of appropriation, regardless of state lines, and for the general benefit of all interests.

SEC. 3. The Evidence Taken.

Pursuant to the order of the court made in this case, the parties began taking evidence at Wichita, Kan., on the 15th day of August, 1904, and with a few intermissions the taking of evidence was continued from day to day at numerous places in the state of Kansas, the state of Colorado, the territory of New Mexico, the state of Arkansas, and the city of Washington, and was finally concluded at Topeka, Kan., on the 16th day of June, 1905. The evidence consists of 8559 typewritten pages, of which the complainant's evidence in chief and on rebuttal occupies 3617 pages; the defendants' evidence occupies 3284 pages, and the intervenor's evidence occupies 1646 pages. Three hundred and forty-seven witnesses were sworn and testified, of whom 143 testified on behalf of the complainant, and 156 on behalf of the defendants, and 48 on behalf of the intervenor. One hundred and twenty-two exhibits were introduced and are filed in connection with the testimony in

the case, 68 being introduced by the complainant, 32 by the defendant Colorado, 1 by the Graham Ditch Company, 3 by the Arkansas Valley Sugar Beet and Irrigated Land Company, and 18 by the intervenor. A descriptive list of these exhibits is found on page 2287 of the abstract, and an alphabetical list of the witnesses is found on page 2294 of the abstract. The points suggested by the court in its opinion were fully considered, and the evidence made as specific as circumstances would permit.

The conditions, so far as they were pertinent to the issues joined in the pleadings, were described by the witnesses and illustrated by the exhibits, as they existed in the states of Kansas, Colorado, Arkansas, Texas, Nebraska, South Dakota, North Dakota, Montana, Wyoming, Utah, Nevada, Idaho, Washington, Oregon, and California, and in the territories of New Mexico, Arizona, Oklahoma, and the Indian Territory, an area which is nearly two-thirds of the total area of the United States. The original copy of this evidence is now on file in the office of the clerk of this court.

Under a former order of the court, an abstract of the evidence was made by the attorneys for the respective parties, which abstract of the evidence is found beginning on page 251 of the printed record. The references to particular testimony, or to the introduction of a particular exhibit, are made to the paging of the abstract, each page of the abstract having a marginal paging referring to the paging of the original evidence as filed in the case. The federal statutes bearing upon the issues in this case were printed in full in appendix A of the brief of the complainant on the demurrer, and the constitutional provisions and statutes of Colorado bearing upon the issues of the case were printed in that brief in appendix B. These briefs being on file in the office

of the clerk of this court, we do not deem it necessary to reprint these statutes.

On the 16th day of October, 1905, an order was entered directing that the complainant file and serve its brief by the 16th day of January, 1906; that the defendants file and serve their briefs by the 16th day of April, 1906; that the intervenor file and serve its brief by the 16th day of July, 1906; and setting the case for hearing on the 9th day of October, 1906 (249).

II.

THE FACTS OF THE CASE.

SEC. 4. The Arkansas River.

The Arkansas river rises on the eastern slope of the Rocky Mountains, above Leadville, at an elevation of 11,000 feet, and flows through the counties of Lake, Chaffee, Fremont, Pueblo, Otero, Bent, and Prowers, in the state of Colorado, and enters the state of Kansas at the western line of Hamilton county at an elevation of 3370 feet. It then flows east, northeast and southeast through the counties of Hamilton, Kearny, Finney, Gray, Ford, Edwards, Pawnee, Barton, Rice, Reno, Sedgwick, Sumner, and Cowley, in the state of Kansas, and enters the territory of Oklahoma at an elevation of 1050 feet, and then flows through the territory of Oklahoma, the Indian Territory, and the state of Arkansas, and empties into the Mississippi river. The total length of the Arkansas river is 1410 miles, the length of the river in Colorado being about 357 and the length of the river through the state of Kansas being about 350 miles. The drainage area of the Arkansas river in Colorado is 26,000 square miles and the drainage area in the state of Kansas is 20,000 square miles. The Arkansas valley, which will be more particularly described hereafter, is confined to the state of Kansas, and has an area of about 2500 square miles.

The population and total assessed valuation of the counties in Colorado through which the Arkansas river

flows, for the year 1900, as shown by defendant's exhibit No. 22, are as follows:

County.	*Population.*	*Assessed valuation.*
Lake	18,054	$806,538
Chaffee	7,085	1,125,681
Fremont	15,636	4,803,402
Pueblo	34,448	6,048,415
Otero	11,522	7,577,440
Bent	3,049	3,291,487
Prowers	3,766	5,271,930
Totals	93,560	$28,924,893

The population and total assessed valuation of the counties in Kansas through which the Arkansas river flows, for the year 1904, as shown by the public records, are as follows:

County.	*Population.*	*Assessed valuation.*
Hamilton	1,566	$1,027,502
Kearny	1,136	693,026
Finney	3,405	1,217,179
Gray	1,640	1,028,833
Ford	7,091	2,395,828
Edwards	5,286	1,744,838
Pawnee	6,151	2,523,284
Barton	14,342	5,503,545
Rice	13,616	3,482,362
Reno	30,028	7,877,615
Sedgwick	51,307	13,005,967
Sumner	25,701	7,153,852
Cowley	32,029	6,138,529
Totals	193,298	$53,792,360

In the counties of Prowers, Bent, and Otero, in Colorado, nearly the whole population is found in the towns along the Arkansas river and living on the lands irrigated from the ditches supplied by the river, and nearly all the property making up the total assessed valuation in these counties is found within these districts. The irrigated lands under these Colorado ditches are worth from $60 to $250 an acre (974), and are on the tax-rolls of the state of Colorodo at an average assessed valuation of $30 an acre. In the counties of Hamilton, Kearny, Finney, Gray, and Ford, in Kansas, nearly the whole

population is confined to the Arkansas valley. The lands in the Arkansas valley in these counties in Kansas are worth from $2 to $30 an acre, and these bottom lands are on the tax-rolls of Kansas at an average valuation of from $2 to $5 an acre. The uplands in these counties are worth from 50 cents to $2.50 an acre, and are assessed at an average valuation of not to exceed $1 an acre.

The principal cities along the Arkansas river in Kansas, with their populations for the year 1904, are: Syracuse, 670; Lakin, 310; Garden City, 1550; Cimarron, 288; Dodge City, 2826; Kinsley, 1214; Larned, 1804; Great Bend, 2630; Sterling, 2170; Hutchinson, 10,668; Wichita, 31,549; Arkansas City, 7061. All of these cities, except Sterling and Arkansas City are the county-seats of the counties in which they are located.

The fall of the Arkansas river through the western portion of its course in the state of Kansas is about seven feet to the mile, through the central portion of its course the fall is about six feet to the mile, and through the eastern portion of its course in the state of Kansas the fall is about five feet to the mile. The width of the river in the state of Kansas, as it originally flowed and as shown by the surveys made by the United States government in 1867 and 1872, was 1160 feet at Syracuse, 1181 feet at Garden City, 1528 feet at Dodge City, 1904 feet at Kinsley, 1486 feet at Larned, 1584 feet at Great Bend (1902); the width at Hutchinson was about 1200 feet, and the width at Wichita and Arkansas City was about 1000 feet between the banks as originally surveyed (2131).

The average flow of the river at Canon City for the last sixteen years has been 750 cubic feet per second of time (644), but during this period the average flow at the Kansas-Colorado state line has been much less. The average flow of the Fountain river, flowing into the

Arkansas river at Pueblo from the north, for the months of July, August, and September, 1901, was about 32 cubic feet per second (exhibit No. 38); the average flow of the Apishapa river, flowing into the Arkansas river at Manzanolo from the south, for the same months, was about 48 cubic feet per second (exhibit No. 37); the average flow of Timpas creek, flowing into the Arkansas river just above La Junta from the south, for the same months, was 43 cubic feet per second (exhibit No. 36); and the average flow of the Purgatoire river, flowing into the Arkansas river at Las Animas from the south, for the same months, was 197 cubic feet per second (exhibit No. 35). The average flow of the other rivers and creeks and streams in the state of Colorado that flow into the Arkansas river was not definitely shown in the evidence. The Arkansas river in Kansas has no tributaries that furnish any great or constant amount of water until the Little Arkansas river is reached, at Wichita, and from this point on down to its mouth the tributaries increase both in number and in size. Below the confluence of the Arkansas river and the Little Arkansas river at Wichita, the Arkansas river has never been known to be dry, but always contains flowing water even during the periods of longest and most extreme drought. The Arkansas river is meandered from its mouth to the Kansas-Colorado state line (286, 469), and was once navigable below the city of Wichita, and is now navigable below Fort Gibson, in Indian Territory (759, 1310).

Through the greater portion of Kansas the Arkansas river runs upon a ridge higher than the surrounding country, formed in the course of ages by deposits of alluvium and silt brought from the mountains. In its early geological history, the Arkansas river may have been as wide as the Arkansas valley, extending back to the uplands on each side, but in its later geological his-

tory the river was confined to a much narrower bed, and then throughout its whole course through the state of Kansas, and especially below Dodge City, began depositing material and building banks on either side, which in the course of ages became higher than the lands further from the immediate bed of the river. Through this lower land, lying back from the river, and having the same general slope and fall of the river itself, tributaries were formed, which, during the season of rains, were in part supplied from the surface run-off, and the balance of the time, when there was little or no rain, were supplied from the underflow of the river. From this peculiar formation and condition arises the unique relation between the river and its tributaries, which will be described in the next section. The river feeds its tributaries, which are lower than the bed of the river, and later, and lower down the valley, these tributaries return this water to the main stream. This characteristic of the Arkansas river through the state of Kansas is not found prevailing as to any other stream described in the evidence.

The Arkansas river has again and again been compared with the Nile, and this comparison is not inapt. The whole flow of the Arkansas river above the city of Wichita is supplied from the melting snows in the mountains and the rains along the foot-hills and the adjoining uplands, supplemented, of course, to a certain extent by the run-off from the uplands in Kansas during the rainy season of the year. Between the Kansas-Colorado line and the city of Wichita there are no tributaries that furnish any great, permanent or original supply of water to the Arkansas river except during the few days of heavy local rains. Its main, constant and permanent flow comes from Colorado and not from additions supplied within the state of Kansas. It is like the Nile in this respect, and when the water from above is shut off the flow of the river below must cease.

SEC. 5. The Tributaries.

With the tributaries of the Arkansas river in the state of Colorado we have little to do except as to the quantity of water they furnish to the main stream. The tributaries of the Arkansas river in the state of Kansas are of two classes: those which are perennial and those which are intermittent. Of the perennial streams coming down the river from the Colorado line, the Pawnee river is first found. It rises near the north bank of the Arkansas river in Gray and Ford counties, with also small tributaries rising in Finney, Hodgeman, Lane and Ness counties, and flows into the Arkansas river at Larned. The next of the perennial tributaries is the Little Arkansas river, which rises in Rice county and flows almost parallel with the Arkansas river, and empties into it at Wichita. The next is the Ninnescah river, which rises in Pratt county and flows into the Arkansas river four miles above Oxford, in Sumner county. And the last of the perennial streams is the Walnut river, which rises in Butler county and flows into the Arkansas river three miles below Arkansas City. A line of flint hills extends along almost the entire length of the Walnut river on the west and between it and the Arkansas river down to Arkansas City. The intermittent streams are more numerous, but of limited number. The principal ones are Coon creek, which rises near the Arkansas river at Fort Dodge, flowing almost parallel with the Arkansas river, and empties into it at Garfield; Walnut creek, rising on the divide between the Smoky Hill and the Arkansas, and empties into the Arkansas river at Great Bend; Rattlesnake creek, rising near the south bank of the Arkansas river, near the town of Ford, in Ford county, flowing almost parallel with the Arkansas river, and empties into it near Sterling; Cow creek, rising in Barton county,

flowing nearly parallel with the Arkansas river, and empties into it five miles below Hutchinson; and the Cowskin creek, rising near the Arkansas river at Colwich, flowing nearly parallel with the Arkansas river, and enters it just above the mouth of the Ninnescah, near Whitman, in Sumner county.

The Walnut river is in the general drainage area of the Arkansas river, but it is not in the Arkansas valley, and is not directly affected by the Arkansas river. The Walnut creek rises on the high, level table-lands between the Smoky Hill and the Arkansas rivers, is not in the Arkansas valley, and is not affected by the Arkansas river except for a very short distance above its mouth. The Pawnee river throughout its whole course is affected by the flow of the Arkansas river. Coon creek, Rattlesnake creek, Cow creek, the Little Arkansas river and Cowskin creek flow throughout nearly their whole length in the Arkansas valley, and are affected throughout their course by the Arkansas river. The Ninnescah river is fed by a great number of springs in Pratt county, receiving their supply from the underflow of the Arkansas river. Within recent years the flow of the Pawnee river has sometimes been known to be very low. The Little Arkansas river and the Ninnescah river, however, while their flow may be lessened during a period of drought or when the flow of the Arkansas river has ceased, have never been known to go dry, although no rain may have fallen on the lands near their head waters for months, but their perennial and inexhaustible supply comes from the underflow of the Arkansas river.

One prominent characteristic marks all of these streams which rise in or flow through the Arkansas valley, and that characteristic is, that the course of all these streams is practically parallel with the Arkansas river, and the bed of each of them is lower than the bed

of the Arkansas river at a corresponding point. The sources of the Pawnee river on the south are within from one to four miles of the north bank of the Arkansas river, and the springs, which supply the small streams going to make up this branch of the Pawnee river, are always found on the side of those creeks next to the Arkansas river, being on the south side of the creeks when the creeks flow east, and on the west side of the creeks when the creeks flow north (1938). The bed of the Pawnee river through Hodgeman county is 200 feet lower than the bed of the Arkansas river through Ford county. This same characteristic is true of the Rattlesnake throughout its whole course, being supplied from streams near the south bank of the Arkansas river, and the numerous streams that supply its perennial flow all being on the north and west side (2055). The bed of the Rattlesnake through portions of Stafford county is 97 feet lower than the bed of the Arkansas river through corresponding portions of Pawnee county. The bed of the Little Arkansas river at Medora is 49 feet below the bed of the Arkansas river at Hutchinson ; its bed at Buhler is 59 feet below the bed of the Arkansas river at Hutchinson, and the springs are on the south side altogether (1839, 2099, 2103). At Twenty-first street in the city of Wichita, about four miles north of the center of the city, the bed of the Little Arkansas river is 13 feet below the bed of the Arkansas river at a corresponding point ; and at Thirteenth street, two miles north of the center of the city, its bed is $8\frac{1}{2}$ feet below the bed of the Arkansas river at a corresponding point (2170). The bed of Cowskin creek is also below the bed of the Arkansas river at a corresponding point (2171).

During the wet season of the year all of these streams in the Arkansas valley carry off the waters that fall from rains or melting snows on the adjoining lands and sur-

rounding plains, and during the dry season of the year to a greater or less extent the flow of their waters is supplied from the underflow of the Arkansas river.

SEC. 6. The Navigability of the River.

The Arkansas river through its whole course in Kansas, and for a short distance in eastern Colorado, is a meandered stream. Its boundaries were fixed by the surveys made by the United States government in the years 1867 and 1872. The bed of the river between the meandered lines has never been deeded nor patented by the government, and the bed of the river passed to the state of Kansas in trust on its admission to the Union as a state on January 29, 1861. The state of Kansas has never pretended to deed or in any wise convey any of the lands between these meandered lines, and now holds such lands and the bed of the river in trust for the benefit of all the people, and could not abrogate its sovereignty over the bed of this river even if it were desirable. In early years, by all parties, and especially by the United States government, the Arkansas river was considered practically navigable as far up as the city of Wichita. In the year 1879, $20,000 were appropriated by the government for the improvement of the Arkansas river between Fort Smith, Ark., and Wichita, Kan. (333). In 1880, $15,000 were appropriated for the same purpose; in 1881, $24,000 were appropriated for the same purpose; and in 1882 a further appropriation of $35,000 was made for the same purpose (334). During these years $94,000 were expended on improving the navigability of the river between Fort Smith, Ark., and Wichita, Kan. In the year 1864 the legislature of Kansas enacted chapter 97 of the Laws of Kansas, 1864, entitled "An act declaring the Kansas, Republican, Smoky Hill, Solomon and Blue rivers not navigable, and authorizing the bridging of the same" (334). The Arkan-

sas river was not included within the rivers mentioned in in this act, and its navigability has never been denied or questioned by any legislative act or judicial decision. On two different occasions the navigability of the river at Wichita was submitted to juries (1715), and in each case the jury found that as a matter of fact the river was navigable. One of these cases was appealed, and is the case of Steinbuchel v. Lane, 59 Kan. 7. Boats were built at Wichita with steam power for use down the river (267, 2139). In the spring of 1878 a boat fifty feet long and sixteen feet wide was built at Arkansas City; made trips up and down the river for sixty miles (405). Complainant's exhibit No. 6 is a picture of a steamboat 125 feet long, which came up the Arkansas river in 1878, and this picture was taken by the witness Mr. Bonsill, at Arkansas City, on July 4, 1878 (385). In the fall of that year wheat was shipped down the river to Little Rock. In November, 1878, the "Cherokee," eighty-five feet long and sixteen feet wide, propelled by steam power, was launched at Arkansas City (385). The "Kansas Miller," sixty feet long and twenty feet wide, the "General Wiles" and the "Nonesuch" (397 and 405) were brought up the river to Arkansas City and there loaded with wheat, flour, and lumber, which cargoes were carried down the river to the points of their destination. Barges were also built at Arkansas City and carried shipments of wheat down the river. Major Pike says: "The Arkansaw appeared at this place to be much more navigable than below where we first struck it; and for any impediment I have yet discovered in the river, I would not hesitate to embark in February at its mouth and ascend to the Mexican mountains, with crafts properly constructed" (757). Mr. Edward Everett Hale, on page 115 of his work entitled "Kansas and Nebraska," says: "It is said, however, that a steamboat can ascend at full water within twenty-four

miles of the great bend—the point where the river gains its greatest northern latitude" (757). Captain Taber, in his report, found in "Executive Document No. 90 of the Forty-ninth Congress, First Session," says: "There is no doubt but that a two-foot channel can be provided whenever the development of the country warrants it, and the river should be for all purposes of law rated as navigable to Wichita, Kan." (759).

Engineer J. D. McKown, after examining the river between Wichita and Arkansas City, made his report on January 27, 1879, and says:

"I had the advantage of seeing the river at a very low stage of water and in its worst condition. At no time during the examination was there a rise of more than six inches, and that lasted but a few days. . . . The river bottom is of rock, but there is a fair depth of water—from 2½ to 6 feet. . . . That portion of the country tributary to the river in Kansas, from Wichita to the state line, is rich, fertile, and well cultivated, and would derive great benefit from the opening of the river to navigation." (1853, 1854.)

The coming of the railroads into Arkansas City about the year of 1878 may have interfered with the uses and further navigation of the river, but their coming did not affect its navigability. In the later years the head of practicable navigation has been at Fort Gibson, in the Indian Territory, and below that point the navigability of the river depends almost wholly upon the waters furnished to the river within these territories. Whether the river ever was or ever could have been made practicably navigable between Arkansas City and Wichita is not a fact to be determined in this case. But it is a fact, established by the evidence, that the river is a meandered stream, was considered navigable as far as Wichita during certain portions of the year, that appropriations were made and the money expended for the improvements of the river between Wichita and

Fort Smith, that boats adapted to the waters of such a stream were actually built and used; but it is also a fact that after the diversion of waters, hereafter to be described, the Arkansas river has not been considered navigable further than Fort Gibson. The complainant in this case may not be in position to complain of the destruction of the navigability of an interstate stream, which is under the control of the United States government, but the complainant has not deemed it improper to present these facts to the court, leaving the protection of navigable streams to the United States government, where it properly belongs. The complainant is in position, however, to claim that the Arkansas river in Kansas, both in fact and under governmental rules and regulations, is a navigable river; and that the ownership of the bed of the stream is in the state of Kansas, and that it is the duty as well as the right of the state to prosecute this action for its protection.

SEC. 7. The Elevations Along the River.

All the streams in the Arkansas valley are fed by the Arkansas river, and the beds of these tributaries are lower than the bed of the Arkansas river at corresponding points. Walnut creek, at Great Bend, and the Walnut river, at Arkansas City, are not in the Arkansas valley, although within the drainage area of the river.

The elevations along the Arkansas river through the state of Kansas and along the tributaries, so far as shown by the evidence, are as follows (1839):

Coolidge	3,348	Great Bend	1,850
Syracuse	3,227	Scott City	2,971
Garden City	2,836	Dighton	2,761
Cimarron	2,625	La Crosse	2,061
Dodge City	2,484	St. John	1,915
Kinsley	2,171	Ellinwood	1,789
Larned	2,002	Sterling	1,644
Jetmore	2,268	Hutchinson	1,533

Medora	1,484	Wichita (R. I.)	1,297
Buhler	1,474	Oxford	1,163
McPherson	1,497	El Dorado	1,291
Burrton	1,457	Augusta	1,221
Halstead	1,388	Greensburg	2,235
Sedgwick	1,377	Pratt	1,885
Valley Center	1,348	Kingman	1,505
Wichita Heights	1,331	Winfield	1,121
Wichita (Mo. Pac.)	1,302	Arkansas City	1,073
Wichita (S. F.)	1,300		

From these figures certain facts appear which become very important in the description of the Arkansas valley, the flow of the river, and of the underflow, which are hereafter discussed.

Between Coolidge and Dodge City, a distance of 117 miles, the fall of the river is 864 feet, or 7.4 feet per mile. Between Dodge City and Hutchinson, a distance of 134 miles, the fall of the river is 915 feet, or 6.4 feet per mile. Between Hutchinson and Arkansas City, a distance of 98 miles, the fall of the river is 460 feet, or 4.7 feet per mile, Between Coolidge and Arkansas City, a distance of 350 miles, the fall of the river is 2277 feet, or an average of 6.5 feet per mile. Between Dodge City and Larned, a distance of 69 miles by the river, the fall of the river is 482 feet, or 7 feet per mile. Between Great Bend and Wichita, a distance of 99 miles, the fall of the river is 548 feet, or 5.5 feet per mile. Between Sterling and Wichita, a distance of 66 miles, the fall of the river is 342 feet, or 5.2 feet per mile. Between Hutchinson and Wichita, a distance of 47 miles, the fall of the river is 231 feet, or 5 feet per mile. Between Wichita and Arkansas City, a distance of 51 miles, the fall of the river is 229 feet, or 4.5 feet per mile.

The elevations along the Pawnee river and along the Little Arkansas show a series of facts which are not only interesting in themselves, but very important in the further consideration of the case. Between Jetmore, on the Pawnee river, and Larned, where the Pawnee

empties into the Arkansas river, a distance of 46 miles, the fall of the Pawnee river is 266 feet, or 5.8 feet per mile. Jetmore is 216 feet lower than Dodge City. Between a point 46 miles above Larned on the Arkansas and Larned the fall of the Arkansas river is 322 feet, and this point 46 miles above Larned on the Arkansas river is 56 feet above the Pawnee river at Jetmore, also 46 miles above Larned. The whole level of the Pawnee river is below the level of the Arkansas river at a corresponding point and equally distant from their confluence.

This same state of facts is also true of the Little Arkansas river. Between Medora and Wichita, a distance of 46 miles, the fall of the Little Arkansas river is 172 feet, or 4.2 feet per mile. Between Buhler and Wichita, a distance of 41 miles, the fall of the Little Arkansas river is 172 feet, or 4.2 feet per mile. Between Halstead and Wichita, a distance of 23 miles, the fall of the Little Arkansas river is 93 feet, or 4.2 feet per mile. Between Sedgwick and Wichita, a distance of 17 miles, the fall of the Little Arkansas river is 75 feet, or 4.4 feet per mile. Between Valley Center and Wichita, a distance of 10 miles, the fall of the Little Arkansas river is 46 feet, or 4.6 feet per mile. Between a point 41 miles above Wichita on the Arkansas river and Wichita the fall of the Arkansas river is 205 feet, and this point 41 miles above Wichita on the Arkansas river is 32 feet higher than a corresponding point 41 miles above Wichita on the Little Arkansas river. At a point 23 miles above Wichita on the Arkansas river the level of the Arkansas river is 22 feet above the level of the Little Arkansas river at Halstead, also 23 miles above Wichita. Medora is 49 feet lower than Hutchinson, and Buhler is 59 feet lower than Hutchinson. At Twenty-first street in the city of Wichita, about 4 miles north of Douglas avenue, the bed of the Little Arkansas river is 13 feet below the bed of the Arkansas river at a corresponding point; and

at Thirteenth street, about two miles north of Douglas avenue, the bed of the Little Arkansas river is $8\frac{1}{2}$ feet below the bed of the Arkansas river at a corresponding point (2170). From these figures it clearly appears that the bed of the Little Arkansas river, throughout its whole course, is a number of feet below the bed of the Arkansas river at a corresponding point and equally distant from their confluence (2099).

Similar conditions exist along Coon creek, the Rattlesnake, Cow creek, and the Cowskin (1987, 2019, 2055, 2096). This unique formation of the Arkansas valley, and the tributaries being lower than the Arkansas river, account for some important facts hereafter discussed.

SEC. 8. The Arkansas Valley.

The Arkansas valley differs entirely from the drainage area of the Arkansas river. The drainage area of the Arkansas river extends back to the divide which marks the boundary of the Arkansas river system from the other systems, and in Colorado contains 26,000 square miles of territory, and in Kansas contains 20,000 square miles of territory. The Arkansas valley, however, is confined to the state of Kansas, and is a distinct, positive and well-defined formation. It extends back to the foot-hills on either side of the river, and contains about 2500 square miles of territory. This Arkansas valley in Kansas has no counterpart whatever in the state of Colorado. The valley practically begins at the west line of the state of Kansas and, at varying widths, extends along either side of the Arkansas river throughout its course of 350 miles in the state. No other valley has been described within the range of the testimony in this case corresponding to the Arkansas valley in the state of Kansas. In its natural state it was very productive, and the source of its fertility is *sui generis*.

The lands within the drainage area of the Arkansas

river in the state of Colorado are naturally dry, arid, level, adobe soil, covered with the ordinary vegetation of the arid plains, such as sage-brush, cactus, etc. This aridity and this vegetation in the state of Colorado extend down to the very banks of the river, and in its natural condition, and before these plains were irrigated, the lands along the river in Colorado were unaffected by the flow of the river, and were not saturated by its waters (541, 979). About the state line between Colorado and Kansas, and along either side of the river, a different formation is found. Below this point the river banks become less abrupt, the soil is of a different character, the vegetation is of a different kind, and from the incoming of the white man natural hay meadows were found, with a spontaneous and luxuriant growth. The soil within the Arkansas valley through the state of Kansas is a rich, black, sandy loam, not adobe in character, and is from two to five feet deep, and beneath this, in a few places, a thin layer of clay is sometimes found; beneath this sandy loam, or beneath this layer of clay where it is found, is a layer of quicksand from one to three feet deep; and beneath this is a layer of coarse gravel from five to twenty or more feet thick, extending to the underlying rock. All of this soil, with the exception of the clay, which is too limited in extent to warrant any consideration whatever, is very porous in character, is highly susceptible to capillary attraction, and is all dampened, saturated and sub-irrigated by the waters from the Arkansas river back to the foot-hills on either side, and to a level within a serviceable depth from its surface (273, 336, 344). The lands of the Arkansas valley are known and described as first and second bottom lands, one gradually shading into the other; the first bottom lands lying immediately adjoining the river, in some places being but a few rods in width and and in others extending back a mile or more, and its

surface being quite level and within from one to five feet of the level of the water beneath; the second bottom lands extending from the first bottom lands back to the foot-hills, being generally from two to eight feet higher than the first bottom lands, and their surface being from five to ten feet above the level of the water beneath. These first and second bottom lands formed originally a strong, natural meadow, covered with a luxuriant crop of wild hay, but none of the vegetation of the arid region was found within their limits (445).

The Arkansas valley in the state of Kansas is of varying width, extending from the foot-hills on one side of the river to the foot-hills on the other side of the river, being about one mile or less in width at the west line of the state of Kansas, widening as it extends eastward, reaching its greatest width between Hutchinson and Wichita, where it is at least twenty-five miles wide, there extending from beyond the valley of the Little Arkansas river on the east to a line beyond the valley of the Cowskin on the west, then gradually narrowing at the city of Wichita to a width of about seven miles, and extending in a converging limit to the south line of the state. Through Hamilton county the Arkansas valley varies from one to five miles in width; through Kearny county it is from one to three miles in width; through Finney county it is from two to six miles in width; through Gray county it is from one to four miles in width; through Ford county it is from two to five miles in width; through Edwards county it is from three to six miles in width; through Pawnee county it is from three to six miles in width; through Barton county it is from five to ten miles in width; through Rice county it is from six to twelve miles in width; through Reno county it is from ten to twenty-five miles in width; through Sedgwick county it is from seven to twenty-five miles in width; through Sumner county it

is from three to ten miles in width; and through Cowley county it is from two to eight miles in width (355, 340). A fair estimate of the width of the Arkansas valley through these counties would give an area of about 2500 square miles in the Arkansas valley in Kansas.

On the south side of the river, between Coolidge and Great Bend, the valley extends back to a line of sand-hills running along the river a greater portion of the distance; and on the north side of the river the valley extends back to a rather abrupt line of bluffs varying from ten to twenty feet in height. Beyond the sand-hills on the south and the bluffs on the north are the uplands, which in their natural state were covered with buffalo-grass. Between Coolidge and Dodge City the lands of the Arkansas valley are practically level, sometimes on one side of the river sloping toward the river, and in some places the lands back from the river are lower than the lands adjoining the banks of the river. From Dodge City down the river this peculiar characteristic in the formation of the valley becomes more noticeable and more marked, and the lands begin to slope on both sides of the river away from the banks. Back from the river on the north at Dodge City a mile or more the surface of the lands slope toward the many branches of the Pawnee river, and below that point they slope toward Coon creek, Walnut creek, Cow creek, and the Little Arkansas river. On the south, from below Dodge City, they gradually slope toward the Rattlesnake and the Cowskin, and for some distance toward the Ninnescah river (1925, 2055).

In the upper portion of the valley the water-level beneath these first and second bottom lands is practically on a level with the water in the Arkansas river, at some times and in some places being a little higher, and at other times and in other places being a little lower. In

the lower two-thirds of the valley the water-level under the lands near the river is practically on a level with the water of the river, but back toward the valley streams or tributaries the water-level beneath these bottom lands is lower than the level of the water in the river, and is thus furnishing a constant supply of water to these valley streams or tributaries, appearing in innumerable springs located along the sides of the streams next and nearest to the Arkansas river (1986, 2055, 2099, 2161).

The lands comprising the Arkansas valley in the state of Kansas were, in their natural state, as rich and productive as any to be found in the most-favored localities. This black, porous loam, fertilized by ages of decaying vegetation, is from two to eight feet deep, with not enough swampy places along the river to demand a mention, and with patches of clay hard-pan so small in extent and limited in number as to be unworthy of estimate in a general description.

These first and second bottom lands forming the Arkansas valley in the state of Kansas are all directly affected by the flow of the water in the Arkansas river, whether they are geographically adjoining the river banks or lie further back. The water-level beneath all of these lands responds to the condition of the river, rising when the waters in the river rise, and falling when the waters in the river fall, varying in time according to the distance and continuance of the water in the Arkansas river (275, 280, 282, 287, 293, 300, 302, 311, 323). A flood in the river lasting but a few hours produces but little effect upon the water-level beneath the bottom lands, and whatever effect is produced is confined to the lands immediately adjoining the river. High water in the river, however, which lasts a few days, or a few weeks, will raise the water-level beneath all these lands extending back to the foot-hills. Every

well, every cellar and every excavation made within the Arkansas valley, which is dug deep enough to strike the water-level, responds to the condition of the water in the river. Cellars and excavations in the cities and towns, or on the farms, in the Arkansas valley, which are dug when the Arkansas river is low will always have plenty of water in them when the Arkansas river is high. Cellars in the city of Wichita had a bountiful supply of water in them during the period of high water in July, 1904, which had been dug within the last fifteen years, and prior to that time had never been flooded (261, 346, 2135, 2152). The fertility of the soil of all of these bottom lands back to the foot-hills on either side, to a greater or less extent, is dependent upon the amount of water flowing in the Arkansas river. The numberless springs along the Arkansas river side of each of the tributaries which flow in and through the Arkansas valley flow strong when the river has been up for a considerable period of time, and flow weak when the water in the river has been low. The Santa Fe well at Burrton, nine miles from the river, is an accommodating register of the condition of the Arkansas river a short time before the observation is made (300, 311). The water-level throughout all these bottom lands from Colorado to Oklahoma responds to the pressure furnished by the Arkansas river as a stand-pipe, this pressure being transmitted according to the ordinary laws of nature (1986). It is largely and almost exclusively to these bottom lands, which form the Arkansas valley in the state of Kansas, that the injuries complained of in this case are confined, and it is to the restoration of their former fertility during the dry seasons of the year that the relief prayed for in this case is directed.

SEC. 9. The Flow of the River.

The flow of the Arkansas river, prior to the time when the waters were diverted for irrigation purposes in Colorado, about the year 1890, covering a period of time beginning with the earliest records, information or observation of witnesses, was as constant and as uniform as the flow of the ordinary river. In all of its history there have been but two excessive floods, one in 1877, and one in 1904; and prior to about the year 1890 the river did not go dry throughout its course in the western portion of Kansas excepting during a period of extreme drought, or for a few days during the dry portion of an extremely dry year. The period covered by the testimony of the witnesses introduced on behalf of complainant extends from 1850 down to the present time, and more than 100 were called by the complainant to give their observations and experiences along the river. The very early years, or the period from 1850 to 1870, were covered by a number of witnesses whose business made their observations keen and acute, and rendered their experience varied and valuable. Mr. A. B. Caldwell, of Hutchinson, was on the Arkansas river between Ellinwood and Pueblo almost the entire time from 1850 to 1862. He was an ox-driver, a hunter, a scout, a guard of emigrant trains, and a guide for federal troops. For fifty-four years, with the exception of a few years when he was in the army and recovering from wounds, he has lived in the Arkansas valley and has observed the flow of the Arkansas river. William Mathewson came to the Arkansas valley in 1851 (2150), settled at Great Bend in 1852, traded, scouted, freighted, traveled and fought up and down the river until 1867, after which time he has lived continuously in the city of Wichita. Robert M. Wright came to the Arkansas valley in 1859, traveled the length of the river through the western portion of Kansas con-

tinuously through all its years of development, and assisted in laying out Dodge City in 1872 (444). James R. Mead settled in the Arkansas valley in 1863, is a man of the widest information, the most extensive reading, and of keen observation, and has continued a resident of the valley since that time, preempting a quarter-section of land in the year 1868, which is now in the heart of the city of Wichita (2127). Mr. M. M. Murdock traveled the length of the Arkansas valley in Kansas and along the Arkansas river in Colorado in the summer of 1860, and in the summer of 1872 moved to the city of Wichita and founded the Wichita *Eagle*, which he has published ever since (251). These early witnesses were followed by more than a hundred others, many of whom settled in the Arkansas valley as early as the year 1870. Concerning the flow of the Arkansas river during those early years, Mr. Caldwell, of Hutchinson, says:

"During the eleven years from 1850 to 1861 I saw the valley between Wichita and the state line every year, and sometimes three or four or five or six or fifty times a year, as the case might be. During those years I was on the Arkansas river I knew the valley practically two-thirds of the time. I saw the river, because I was fording it often. In my employment as hunter for the trains I generally kept pretty close to the valley. There were plenty of Indians at that time, and they were hostile, and it was dangerous to get back from the train. During those eleven years I crossed the river very often. I probably crossed it in those eleven years twenty times a year or more, from Hutchinson west, especially west of Dodge and Garden City. It was mostly in there where the trail was close to the river, and where, when I was a scout for the cavalry, most of our crossing came in.

"The bridge at Hutchinson was a very long bridge—one of the longest in the country.

"Since 1860 the river does not spread out over the

surface so much now as it did then, by one-third. My judgment is that up to the state line it has been a good deal in the same proportion, although not so much farther up. The banks have filled in and narrowed. During those eleven years, from 1850 to 1861, when we were crossing the river it would generally be in places up to the axle of the wagon in crossing with a train ; but I mean not during any flood, but during reasonable weather, when we felt safe to ford it, as we did a good share of the time. It would be something like coming up to the axle of the wagon. To-day at Hutchinson there is a large part of the summer that every bit of the water would run through a six-inch tile. There are times that you can cross there without stepping in the water ; that is at low water. During those first eleven years there were many times when you could n't ford the river. There were times we had to lay by ; we could n't get across. During the last few years there is n't near the same volume of water during the season as there was during those earlier years. This diminution, I should say, was noticed first since 1885. It was noticed in 1886, 1887, 1888, 1889, and in there. It has been nearly stationary for the last few years. For the last seven or eight years there has n't been much change.'' (355, 356.)

Mr. Mathewson, of Wichita, says :

''As to the Arkansas river as I saw it from 1852 down to 1867, when I moved to Wichita, I will say : The Arkansas river was then larger and wider than it is now, and deeper. I say the river was larger ; that is, a wider stream, and it carried more water when I first knew it for years, and there were no islands in it. I don't think there were but two regular islands in the river. One was right here and the other was up this side of Valley Center. The river seemed to be wide and clear, so that there was nothing in the way at all, and I think the river was deeper at that time by considerable than it is now. As to how long that condition existed, I will say it existed probably away long up into the '80's—probably 1885 or 1886, or somewhere along there. I would n't say particularly what year, but it was along about that time, and there was not nearly as

much water in the river, and the islands—the towheads—commenced building up all along the river. By a towhead I mean a little island formed on a sand-bar, and probably some little willows or something will start in the first place, and as the water depreciates in the river of course it will increase and grow and keep growing, until it will form quite an island. In the first place, it is a little bit of a kind of a towhead and you can't just see it. When the water is tolerably high you can just see the top of it sticking out. I know that was the way that Ackerman's island, here in the city of Wichita, was formed. I have crossed that many and many times right there where that island is and there was no more island there than there is right on this floor. As to the changes in the river, there is not nearly so much water in it, and the river is not as wide, and the islands are forming all the time, constantly, and are continuing to increase in number and size down to the present time. . . . Most of my business was in the saddle in the summer time, hunting the stray stock, and of course I was all up and down the river, and I was crossing and recrossing the river nearly all the time. I was in the saddle the biggest part of the time. As to my particular experience in killing buffaloes, why, I expect I have had as much experience as any man in America in that. Yes, sir, that experience gave me a particular name in this country. It was killing buffalo for the first settlers of Kansas that I got the name. It was either the grateful or ungrateful people among the first settlers of Kansas who gave me the name of 'Buffalo Bill.'" (2150, 2152.)

Mr. Wright, of Dodge City, says:

"I was along the Arkansas river a great deal of the time from 1859 up to 1885, and was pretty familiar with it, and I have lived practically on it ever since. During the last few years I have been farming on the river bottom near here, and have been commissioner of forestry for the state of Kansas. The bottom lands near the city of Dodge are about a mile wide. In some places it is wider and some places narrower. There are two bottoms. The second bottom extends to the foot of the hills, which

we call the bluffs. Above the bluffs it is prairie, and we call it upland. The second bottoms rise gradually up from the first bottoms, and are not a great many feet higher. During the first twenty-five years that I knew this river the average flow, excluding the periods of the floods and the freshets, I think was about two feet deep, and perhaps a couple of hundred yards wide. The average flow of the river during the last ten or twelve years, excluding flood and freshet seasons, I think has not been half as great as it was formerly. During the last ten or twelve years the river goes dry very frequently. That condition depends upon the season. Most of the time it is dry, I think one-quarter of the time during the summer. During the first twenty-five years that I knew the Arkansas river there was always a period known as the June rise, which was the flood from the mountains, almost exclusively from the mountains—the melting of snows. It was generally at its height along about the 1st of July here, and that period lasted six or eight weeks from the time it reached its maximum. It would gradually rise in June, but the height of the flood would be about the 1st of July. During those times the water would come to the top of the ground in the low bottoms.'' (444, 445.)

Mr. Mead, of Wichita, says:

''As to the river during the summer season of those years and of the other years, the water was high in the other years; in other words, it was normal, the same as it usually was. By its being normal I mean there was not a great deal of variation in the habit of the river. We always expected high water in May and June, and occasionally excessively high water from rains here in the state of Kansas within 100 miles west. The river, after the May and June floods were over, gradually subsided until it came to a uniform flow of clear, pure water, which usually continued to the late fall, and in a majority of instances continuously all winter. As to how deep the normal flow of the river outside of floods was, I will say the river at its normal condition, as we used to express it in those days, would be about knee-deep; and as to width, for two or three miles immedi-

ately below the city of Wichita it varied from 800 to 1600 feet. . . . As to the first ferry established in the city of Wichita, speaking from recollection, I think it was in the year 1870. My recollection is that the first bridge was built in the year 1872. I was one of the parties that built it and paid for it. Yes, sir, that is the bridge that is shown in complainant's exhibit A–1. That bridge lasted about nine or ten years and then was replaced with an iron bridge, which is the present iron bridge. The present iron bridge was built at the same height as the old wooden bridge, and exactly at the same place. It was built on the same piers.

"Examining complainant's exhibit A–1, I will say that is a fair representation of the river, with the exception that at some times the river was a great deal higher and some times it was lower. As to the stage of the water as shown in complainant's exhibit A–1, I should say that was the ordinary summer stage after the spring floods had subsided." (2130, 2132, 2133.)

Mr. Murdock, of Wichita, says:

"I should say that exhibit A–1 shows the river at the average stage of the water. You see it is ten or twelve or fourteen feet from that bridge down to the water, which was the average stage it used to be. . . . The picture shown as exhibit A–1 might have been taken as late as 1877 or 1878, and was published in a directory which I printed in the year 1878. This picture was taken from the south side of the bridge and from the east side of the river, the river flowing almost due south at the city of Wichita. Exhibit A–2 is a picture of the new bridge, taken from the south side of the bridge and the west side of the river. This is the present bridge, and shows eight spans. As the river kept dwindling away we kept taking spans out of the original bridge, taking two from the east and one from the west side, leaving five spans in the bridge now. . . . Exhibit A–3 is a picture of the bridge across the Arkansas river at Douglas avenue in the city of Wichita, taken from the south side of the bridge and the east side of the river, showing the bridge with seven spans. This picture shows the river a little low. The sand-bar

formed below the middle pier indicates that the river was low; but I could n't give the number of courses of stone in the abutments which would show when the river was low. During the seventies the average flow of the river during the dry season of the year was such that if a fellow did n't want to go across the bridge he could ford it, and he did. I would sometimes go down there with the teams for water and there would probably be three or four feet of water. It would n't run up to the bed of the wagon; and this would be something like the average flow of the water during the dry season of the year. For the last ten years during the dry season of the year there has sometimes been no flow at all." (252, 253.)

Mr. Lawrence, of Wichita, says:

"When I came here we always had to ford the river, but during the spring of 1870 there was a ferry established right near where the Douglas avenue bridge is now. That ferry was used during the high water until the completion of the bridge, which was built in the winter of 1871–'72. That is the bridge shown in exhibit A–1. During the periods of low water we always had to ford it. From 1870 to 1872 we either crossed the river on a ferry or forded it. There was then a good part of the river that we could not ford it except on horseback and swimming. We frequently did that, but during the high water the water would be so high we could n't ford it on a wagon; the water would come into the wagon. I forded it many times during the first two years after I came here when the water did not come into the wagon. . . . When the Douglas avenue bridge was built it was built 800 feet long. . . . During the first years I knew it, the Arkansas river varied a good deal, even in the dry months, as we called them. Sometimes the water would get pretty low in the winter then, but it would usually cover the axles of the wagon. I don't know as I ever saw it when it would not in some part of the river come up to the axles. It is pretty difficult to give an average, because it was very much deeper in some places than in others. If you go to the sand-bars it would be very shallow, but I would say it

would average, if it was spread out, probably a foot deep and 1000 feet wide." (319, 320.)

Mr. Fullington, of Wichita, says:

"I have been acquainted with the Arkansas river from 1881, and my familiarity with the river would extend through the months of September, October and November more particularly. Our ranches were south, and that was the season of the year in which we drove our beeves and held to the river and crossed it back and forth, and during that time I would think the normal depth was from two to four or five feet. It would run anywhere from belly deep up to high up on the saddle-skirts of an ordinary horse. This same depth would extend on down the river. At some points it would be deeper than others, owing to the width of the channel. The channel would vary in width, I should think, from 500 to 1000 feet in Hamilton county, and about the same in Kearny county, and about the same all the way down." (341.)

Mr. Rutledge, of Colwich, says:

"I observed the flow of the river during the thirty-odd years I lived there. The average flow during the dry season, excluding the months of May, June, and July, for the first ten or fifteen years that I lived there was about, I should think, from two and a half to three feet deep. The width of the river varied in places. Right east of my place I should think it must have been 1200 to 1500 feet wide from bank to bank." (302.)

Mr. Harrison, of Colwich, says:

"I have been acquainted with the Arkansas river for the first fifteen years after I came here, and with the flow during the dry season of the year for the last ten years. The average flow of the Arkansas river during the dry season of the year has decreased since the year 1885 to the extent of two to five feet." (273.)

Mr. Edwards, of Kinsley, says:

"The depth of the flow of the river during those first years, excluding the flood periods, was about two feet.

During the last ten years a great deal of the time the river has been practically dry. The banks have narrowed through this county very materially. I don't think the river would average over two-thirds to one-half as wide as it used to be. During the early years there was such a thing as the June rise. The river during June used always to run bank full usually. It came from the west, the entire length of the river. We generally considered that the June rise came from the melting snows in the mountains." (425.)

Mr. Wellman, of Kinsley, says:

"The amount of water in the river, on the average, excluding the floods, is just one-half as wide as it was in the average flow when I came here. As to the volume of water in the river, we have n't got any, practically, only at certain times in floods, until this year. The flow at that bridge has filled up just one-half the length of the bridge on the south or east side. . . . The water in the river on the average, as compared with what it was when I first came here, excluding floods, is probably one-fourth. I first noticed the decrease in the flow somewhere about 1890. During the years when I first came here, there were no months in the year when the river was entirely dry. I have never seen during those years very much difference in it through the summer season. Generally, there was about a foot or two feet of water in it at that time. The particular time of what is known as the June rise in those early days came when the snow began to melt in the mountains and we would have a flood; that is all. We have n't had many rises lately." (435, 436.)

Mr. Vernon, of Larned, says:

"From the time I first located in Larned until, I think, in the late '80's, there was quite a volume of water in the river. It was flowing all the time. Since that time the normal condition of the river has been dry—no water in it at all. In those early days I should say the width of the river was 800 to 1000 feet, somewhere along there. During those early days the average depth was probably from one and a half to two feet.

That would vary very much. In places it would be very deep and in other places very shallow. The average across the bed of the river would probably be one and a half to two feet. The bed of the river was changed materially through Pawnee county; in fact, it is very much narrower than it was, and it has filled up until there is hardly any river there. It has willows and brush grown in the river, and it has filled up with sand until it is practically almost level with the country." (441.)

Mr. Beeson, of Dodge City, says:

"Naturally the crops grow upon the bottom lands without irrigation. We strike the sage-brush country close to the state line. In some places near the state line the sage-brush comes down almost to the river. It varies. Through Edwards county the valley would average six or eight miles in width. During the first fifteen years that I knew the river, I should judge that the average flow of the river, excluding floods and freshets, would be about three or four feet across the bottom, on the average. During the last ten or twelve years, excluding the year 1904, I think it has fallen off one-half. There are seasons now when the river is practically dry. Most of the year, practically speaking, the river is dry." (457.)

Mr. Bell, of Dodge City, says:

"During the early times the current of the water flowing in the river was nearly the entire width from bank to bank, and would be from twelve to eighteen inches in depth. As to the average flow of the river now during most of the year, it don't flow most of the time, excluding the time of high water and freshets. It is almost dry. There is just a little stream—very little. It is almost dry. It is a much narrower channel now than it was. It has drifted in. The average width of the channel of water flowing in the river at the present time I would n't think generally over eight or ten feet, and from three to seven or eight inches in the bed of the channel in depth. When it does flow at all it is six or eight feet wide." (473.)

Mr. Gallagher, of Dodge City, says:

"There is not, I will say, a quarter of the amount that there was formerly, when I first knew the river. When my attention was first directed to the marked diminution in the flow of the river was when the Eureka canal had to quit business on account of the lack of water in the river. My recollection is that they had water in the canal for possibly two years." (476.)

Mr. Chambliss, of Dodge City, says:

"The flow of the river during the late years has been less than it was during the first years that I knew it. I don't think that the volume throughout the year would be one-twentieth of what it used to be when I was a lad." (479.)

Mr. Reighard, of Dodge City, says:

"During the first years I was here after 1869 there was considerably more water than there is now, all during the year; and in the same seasons, about the last of May or first of June, we would have what we called the June rise, and that would last until about the first of September. We always counted on high water in the summer. The June rise would come as soon as the snow melted in the mountains in the spring, and sometimes it would come a little earlier. During the late years I don't think we get any water from the melting of the snows in the mountains. This changed condition began about twelve or fifteen years ago, I think. Along there. During the early years, in the winter, along until it would get to the rise, the bed of the river was generally covered with water pretty well over, from bank to bank, and would be from two to three feet deep along there. Hardly that then. About two feet deep, say. It would come up to the hubs of the wagon. From the time the June rise subsided until the fall months there was a good many times when it was pretty difficult to ford. It would come into the bed of the wagon. It would be about the same as during the winter." (486.)

Mr. Pierce, of Lakin, says:

"As to the average flow of the river at Lakin for the last four or five years as compared with what it was when I went there first, there is but very little water in comparison to what we had twenty-five years ago. When I went there the river always had water in it the year round, every day, 365 days in the year. For the last four or five years there have been months at a time that the river has been perfectly dry. This is more especially early in the season. During the summer season there has been but very little water. During the early years, along in June usually, we had what we call in this country the June rise. The river at those times would be full from bank to bank. During the past few years we have n't had that rise every year to any great extent. We began to notice this falling-off in the flow of the river about fourteen years ago—about 1890. It has diminished gradually since. My best judgment would be that during the last four or five years at least four months in the year the water does n't run to amount to anything, and the flow during the remaining months has gradually diminished." (542.)

Mr. Worden, of Syracuse, says:

"During the first seven years, during the dry season, we had a pretty good flow of water most all the time—enough to raise good crops. For the last ten years, excluding the year 1904, we have had very little water, excepting in flood times, except in the winter when it is moist or warm enough so that we can irrigate. We can generally get a little water in the winter. During the dry seasons of the year for the last ten years, excluding 1904, the river has been absolutely dry numbers of times." (560.)

Mr. Pyle, of Garden City, says:

"The average flow of the river during the dry season of the year, for the first five or ten years that I knew it, I should think would be about two to two and a half feet deep on the average. The average flow of the river during the same season of the year for the last five or

eight years, excluding the year 1904, I think would not be one foot. For the last few years the river has been dry most of the time." (566.)

Mr. Diesem, of Garden City, says:

"During the first two or three years I was here it never was dry at any time. There was always some water in it, and during the dry season of the year I should judge the water was from a foot to a foot and a half deep. As to the flow during the dry season of the year for the last ten years, excluding the year 1904, I think it was perfectly dry about two or three months every year with the exception of one. . . . It was dry after July 25, 1903, and from that on all fall and all last winter, and until April or May, 1904. It was as dry as shown in that picture." (574, 575.)

Mr. Longstreth, of Lakin, says:

"When we built that ditch in 1879 or 1880 I could n't state what the average flow of the river was at that point. There was an abundance of water, I know, flowing all the time. The river was never dry in those years. It was a running stream the year round. The supply of water in the ditch at that time was splendid; it was sufficient at all times at that time. I did n't notice any falling-off in the supply of water there for some time afterwards, down to about 1886 or 1887, I think—somewhere along there." (583.)

Mr. Loucks, of Lakin, says:

"Examining exhibit A–45, that picture is a fair view of the river through Kearny county during the last four or five or six months of 1903 and the first few months of 1904. I take it that it shows no water flowing in the river at all. The river has materially decreased in its flow during the dry seasons of the years, as compared with the earlier years." (594.)

From the testimony of all of these witnesses which has been quoted, and from similar testimony of other witnesses which might have been quoted, it clearly ap-

pears that the Arkansas river prior to about the year 1890 had a tolerably uniform flow, increasing each spring when the June rise was caused by the melting snows in the mountains or the rains on the plains and uplands, and then diminishing somewhat during the fall of the year, and especially during the months of September and October. During that early period there were some extremely wet years and some extremely dry years, and during these extremely dry years a part of the river in Kansas would be dry or at least with no flowing water, so that water could only be found in narrow streams or in pools, or by digging into the sands along the river-bed. These dry periods, when the river was either low or dry, would last a few days, and in some extreme cases a few weeks. The longest and severest drought ever known in the Arkansas valley was in the year 1860, which period was known as the great trans-Mississippi drought, when no rain fell from September, 1859, to November, 1860. The year 1874 was known in Kansas history as the grasshopper year, and for some weeks during the fall of that year the river was dry. The year 1879 was also an extremely dry one and the river was correspondingly low. With the exception, however, of these dry periods, from 1850 to 1890 the Arkansas river is shown to have a reasonable, regular and uniform flow, that the river-bed was wide, level, and practically free from islands and obstructions.

The June rise came as regularly as the arrival of spring, sometimes a few days earlier and sometimes a few days later, when the river would flow practically bank full for a period of from two to six weeks; this rise coming gradually and gradually going. The parts of the year when the river was without flowing water were exceedingly short, except during the extremely dry years, when, upon one or two occasions, it was extended into months.

Complainant's exhibit No. 1 is a picture of the Douglas avenue bridge across the Arkansas river at the city of Wichita, taken during the summer of 1878, showing the old wooden bridge, constructed in the year 1872, consisting of eight spans, each being 100 feet long, and showing the water in the river at a uniform or average stage for the summer months. Complainant's exhibit No. 2 is a picture of the iron bridge constructed in 1879, being the same length and the same height as the wooden bridge shown in exhibit No. 1. Complainant's exhibit No. 3 is a picture of the iron bridge taken from the east side of the river and the south side of the bridge, showing seven spans in the iron bridge, the first span having been removed from the west end of the bridge after June, 1889 (364). Exhibit No. 3 shows the water at a low stage, with no obstructions to impede the flow (2133). Ackerman's island is now located near the middle of the Arkansas river and just above the Douglas avenue bridge; it contains now about sixty acres of land, covered with cottonwood trees a foot in diameter, and the lower end of the island extends under and south of the bridge about forty feet (1753, 2163). Ackerman's island is not shown in exhibits Nos. 1 and 3 at all, and appears as the sand-bar above the bridge in exhibit No. 2, when the water was at a lower stage than it was when exhibits Nos. 1 and 3 were taken. The bed of the river remained as shown in exhibits Nos. 1, 2 and 3 down to about the year 1890, and at its narrowest places was 800 feet wide and free from obstructions. Before the bridge was built at Wichita in 1872, the only method of crossing the river was either by ferry or by fording. During the dry period of the year the river could be safely forded at Wichita, and during other portions of the year the river could only be crossed either by use of a ferry or by swimming. Complainant's exhibit No. 52 is a fair representation of a herd of cattle swimming the river at

Wichita during the year 1872 (2183). Cattle then swam the river where Ackerman's island is now located, which is now covered with trees a foot in diameter (1753, 1756). In the year 1877 excessive rains above the city of Wichita added to a full river, until much of the city of Wichita, as it then stood, was overflowed, the crest of this flood coming within about two feet of the floor of the wooden bridge shown in exhibit No. 1 (2139). Exhibit No. 55 is a photograph of the bridge across the Arkansas river at Hutchinson, taken in 1887, showing the water at a medium high stage, with no material obstructions (2082).

Between the years 1888 and 1893 the waters of the Arkansas river were diverted for irrigation purposes in Colorado, and the flow of the river through Kansas was greatly diminished, and for many months in the year it practically ceased. After about 1890 the amount of water coming down the river during the June rise was appreciably less or the June rise did not come at all. The parts of the year when the river was sometimes dry or was low during the early years were now greatly lengthened, coming much earlier in the summer and lasting much later in the fall, or extending even through the winter season. Complainant's exhibit No. 45 is a photograph of the bridge at Garden City, taken in April, 1904, and shows the river-bed perfectly dry, as it had existed from the 25th day of July, 1903, to the time this picture was taken, in April, 1904, and which condition lasted until the first week of the following May (575, 594). Complainant's exhibit No. 41 is a photograph of the bridge at Wichita, taken on the 16th day of September, 1904, showing the iron bridge appearing in exhibits Nos. 2 and 3 after one span had been removed from the west end, in 1889, and after two spans had been removed from the east end at later times. This photograph was taken from the east side of the river and the south side of the bridge, showing the stone

abutments standing two feet above the level of the water, the wooden grillage below, and the piles protruding eighteen inches above the water; this grillage and these piles being below the level of the water as shown in exhibits Nos. 1, 2, and 3 (529). When these piles were driven for the construction of the first bridge cofferdams were built, and the piling cut off below the level of low water as it then existed (322). This wooden structure below the stone abutments was never seen to protrude above the surface of the water until after the year 1890 (268, 322). This bridge, as now shown in exhibit No. 41, is 500 feet long, with Ackerman's island extending beneath it and for a distance of forty feet below, and extending up the river for a mile, and covering sixty acres of ground when the river is at an ordinary stage (2163)

The bed of the Arkansas river between the banks has been narrowed a corresponding amount practically the whole length of the river between Wichita and Larned (321). At the farm of Mr. Harrison, fifteen miles above Wichita, within the last ten or twelve years the river-bed has been narrowed 627 feet by actual measurement, and within the last five years has narrowed 287 feet (274). The places where the banks of the river have been changed by artificial means are so short and so insignificant as to be unworthy of mention when the whole length of the river is taken into consideration. This narrowing of the bed of the river between the banks is also shown by a comparison of the widths of the river in 1872, as shown by the government survey (1902), and by actual measurements made in 1904 (631), which figures are as follows:

	1872.	*1904.*
Syracuse	1,160	780
Garden City	1,181	980
Dodge City	1,528	550
Kinsley	1,904	920
Larned	1,486	500
Great Bend	1,584	700

Between Larned and Wichita there are now thousands of acres of land under cultivation or covered with forests, that twenty years ago were in the bed of the stream or were nothing but a sand-bar, showing only during an extremely dry year and when the river was extremely low. This condition exists for more than 200 miles, and the amount of land that has been made by the receding of the waters has been constantly increasing down to the month of May, 1904. During the early years the river-bed, between the meandered lines, was practically unobstructed either by islands or permanent sand-bars, Lane's island, at Wichita, being the only one that was noted in the records of the government survey. Within the last fifteen years the river-bed for 200 miles above Wichita is practically filled with islands, has become a narrow, winding, lengthened archipelago, one witness in Barton county calling the numerous islands in the river, which he now uses for pasture, his "Philippine possessions" (2051). Exhibit No. 55 is a photograph of the Arkansas river taken at Hutchinson in the year 1887, and exhibit No. 56 is another photograph at the same bridge taken in the year 1900, and exhibit No. 57 is a third photograph of the same bridge looking down the river, taken on the 15th day of May, 1905. Exhibit No. 58 is a photograph of the Arkansas river at the Missouri Pacific railroad bridge one mile east of Hutchinson, taken on the 15th day of May, 1905, showing the bed of the river almost completely obstructed with islands. Exhibit No. 59 is another photograph of the same bridge taken at the same time, looking up the river, and showing the same natural, increasing and tree-covered obstructions. Exhibit No. 60 is a photograph of the Arkansas river taken eighteen miles above the city of Wichita on the 16th day of May, 1905, looking up the river, showing seven islands above the level of the water at extreme flood, which flood marked nearly eight feet on the gauge at Wichita, and

being but one or two feet below the extreme flood of 1877 and the extreme flood of 1904. Exhibit No. 61 is a photograph taken at the same time and the same place, looking down the river, showing five islands above the waters of this flood. The second great flood in the Arkansas river was on the 7th day of July, 1904, caused by rains in the vicinity of Hutchinson. This flood reached about the same height as the flood of 1877, overflowing the city of Wichita, and coming within about eighteen inches of the floor of the Douglas avenue bridge, built at the same height as the old wooden bridge (2133). Throughout the 200 miles above Wichita the bed of the river, between the banks, is to-day about two-thirds as wide as it was twenty years ago; and with the numerous and increasing obstructions in the bed of the river, it is but little wonder that even an ordinary flood would now overflow the lowlands or the first bottoms, doing great damage to the surrounding country, when the same quantity of water in the early years would have passed safely and securely down the river, between its banks and beneath its bridges. That the carrying capacity of the river to carry off large bodies of water or excessive floods has been greatly decreased within the last fifteen years is beyond dispute (2115, 2134, 2185). In the judgment of Mr. Mead, the carrying capacity of the river, the water being at the same height as measured by the banks, has been reduced three-fourths at a point three miles below the city of Wichita, where the narrowing of the river banks and the obstruction of the river-bed have been entirely from natural causes (2134). The bed of the stream, between the banks, from Arkansas City to Dodge City, has been narrowed; sand-bars have been formed and then became islands grown over with trees and vegetation; the whole channel has been obstructed until the carrying capacity of the river, as it flowed twenty years ago, has been de-

creased fully one-half. The bridge at Great Bend consists of nine spans, so constructed that when the river was low or dry a person could drive under each of the spans. At the time evidence was taken at Great Bend the river was flowing a full stream, and yet was flowing under only three of these spans, the others being filled up with sand-bars and islands, largely covered with vegetation and small trees (1616). The bridges at Larned, Kinsley and Hutchinson are in somewhat the same condition, while the bridge at Wichita is only five-eighths as long as it used to be, and the space beneath some of its spans at the present time is so obstructed that the high water of the flood of 1904 did not pass through. At this very same place in the year 1872, when one witness was swimming his cattle across the river, he found not even a sand-bar to interfere (1753, 1756).

This decrease in the flow of the river between the years 1888 and 1893 became so marked, so noticeable, that, as a matter of common scientific and historical information, Mr. J. R. Mead, in the year 1893, presented a paper before the Academy of Science, at Topeka, Kan., entitled "A Dying River," which article is published in the record of its proceedings for that year. The original flow of the Arkansas river, as it was wont to run from the earliest observation of the white man down to the year 1890, is now merely history. It is only a recollection—a memory of the oldest inhabitant. It is a thing of the past. The original flow is gone. It ceased when the corporation ditches in Colorado began their actual operation.

Cuts of seven of the photographs introduced in evidence, showing the Arkansas river, are found at the close of this section, and may be described as follows:

Exhibit No. 1 shows the Arkansas river at the Douglas avenue bridge, taken from the east side of the river and the south side of the bridge. This wooden bridge

was built in 1872, and in 1879 was replaced by the iron bridge shown in exhibits Nos. 2, 3, and 41. The iron bridge was built in the same place, the same length, and at the same height. The wooden bridge was 800 feet long, consisting of eight spans of 100 feet each. Exhibit No. 1 was taken in the summer of 1878, and shows the water at a medium stage for the summer flow.

Exhibit No. 2 shows the iron bridge at Douglas avenue in Wichita, taken from the west side of the river and the south side of the bridge. This photograph was taken some time between 1879 and June, 1889, and before the first span of the bridge was removed after June, 1889. This picture shows the water at a low stage, showing the sand-bar above the bridge which subsequently grew into Ackerman's island.

Exhibit No. 3 is a photograph of the same bridge shown in exhibit No. 2, taken from the east side of the river and the south side of the bridge, but after June, 1889, showing the seven spans left after the first span had been removed from the west end. This picture shows the water at a medium low stage, higher than in No. 2 but lower than in No. 1.

Exhibit No. 41 is a photograph of the same iron bridge, taken on the 16th day of September, 1904. It shows the remaining five spans of the bridge, after the two spans had been removed from the east end, between 1893 and 1900, and is now but 500 feet long. The level of the water is two feet below the stone abutments, the wooden piles protruding twelve inches above the water, and the grillage work occupying twelve inches. The trees are shown on Ackerman's island, now extended thirty feet below the bridge.

Exhibit No. 45 is a photograph of the Arkansas river and bridge at Garden City, Kan., taken in April, 1904, showing the river dry, as it was from July 25, 1903, to May, 1904.

Exhibit No. 60 is a photograph of the Arkansas river taken on the 16th day of May, 1905, below Colwich and eighteen miles above Wichita. This picture is taken looking up the river, showing seven islands within a mile. The water was at a high flood, the gauge at Wichita showing about eight feet, the level of the water being about six feet higher than shown in exhibits Nos. 1, 2, and 3.

Exhibit No. 61 is a photograph taken at the same place and time as exhibit No. 60, looking down the river, showing five islands also within about a mile.

Exhibit No. 1. Summer, 1878. Wichita bridge; eight spans, 100 feet each. Medium summer flow.

Exhibit No. 2. 1879 to 1889. Wichita bridge; eight spans, 100 feet each. Low summer flow.

Exhibit No. 3. After June, 1889. Wichita bridge; seven spans, 100 feet each. Low summer flow.

Exhibit No. 41. Sept. 16, 1904. Wichita bridge; five spans, two obstructed. Water two feet below abutments.

Exhibit No 45. April, 1904. Garden City bridge. River dry. July 25, 1903, to May 3, 1904.

Exhibit No. 60. May 16, 1905. River 18 miles above Wichita. Looking up one mile; seven islands; 7-foot flood.

Exhibit No. 61. May 16, 1905. River 18 miles above Wichita. Looking down one mile; five islands; 7-foot flood.

SEC. 10. The Underflow.

Connected with the flow of the Arkansas river, and as part of it and dependent upon it, is the underflow of the Arkansas valley. This underflow is its one distinct, marked and positive characteristic. In no other valley mentioned in the wide range of this testimony is there anything that corresponds with it. There may be something of an underflow in the Platte river valley, in the Rio Grande valley, and perhaps in some others, but the formation of those valleys is quite different from the formation of the Arkansas valley, and the underflow in those valleys is not so prominent, is less extensive, and far less beneficial. The underflow in the Arkansas valley has been known, talked about, written about and publicly acknowledged for nearly fifty years. From the time Mr. M. M. Murdock discovered the current and presence of the underflow in holes dug in the sands along the river-bed in western Kansas, during the period of the trans-Mississippi drought, in 1860, down to the present time, this underflow has been a known and visible fact to every observing man living in the Arkansas valley, and has furnished its continuous and beneficial effects throughout the length and breadth of the valley to all, whether its presence was recognized or not. Every open well ever dug between the foot-hills on either side of the river; every cellar or excavation of sufficient depth; every pool or pond or lake; every tributary flowing through the valley of the river's own making; the Santa Fe well at Burrton, nine miles from the river, and the Santa Fe well at Larned, a half-mile from the river; every scientific and experimental test made between Syracuse and Arkansas City—each and all have proved the presence of the underflow, its current, its expanse to the foot-hills, and its unvarying dependence upon the flow of water in the Arkansas river. The

level of this underflow from the foot-hills on the one side to the foot-hills on the other rises and falls corresponding to the rise and fall of the water in the river. The lake or pond at Garden city, the South Side ditch at Dodge City, the pools above Larned, Crystal lake, at Sterling, Brandy lake, ten miles below Hutchinson, and the trenches dug for sewer-pipes in the city of Wichita, were all fed directly from the underflow, having no inlets and no surface connections with the river. In every deep cellar dug in the valley between the state line on the west and the territory line on the south, the condition of the water in the river can be determined. The flood of 1904 made its appearance in scores of cellars which had been dug within the last fifteen years and remained dry since their excavation. This underflow of the Arkansas valley has three characteristics—a positive current with a known direction, an extent back to the foot-hills on either side, and an invariable correspondence to the rise and fall of the river. It is distinguished from ground-water on the one hand, and from percolating water on the other hand, and becomes an underground river, with limited banks, and a positive current, of definite direction.

Mr. Murdock, of Wichita, says:

"But what I mean by an underflow is, that immediately under the surface, within eight or ten feet, anywhere in this valley, you strike water. This water has a perceptible flow. I originally discovered the underflow by digging a series of holes on different nights to get water for myself and the oxen. The dust would blow in, and one night I sprinkled some bran on the surface of the water, and next morning when I got up it was on the south or southeast side of the hole. I called the attention of the government man to it, and he said he had found the same thing. This government agent reports that the underflow was moving at the rate of eight or nine feet in twenty-four hours. The Arkansas

river usually rises in June, while the Ninnescah would rise the same time fifteen or twenty miles south, which rises out here on the plains, showing that there is a free circulation of the river waters over into the Ninnescah. The direction of the underflow is generally southeasterly. If you spread something on the surface of the water in a hole, you will find in the morning that the surface has moved with the direction of the river. If the underflow affects the Ninnescah, then it is twenty miles wide anyhow. My home is a mile and a half east of the big river and the water comes into my cellar. During the flood of July 7, 1904, three of my cellars had three or four feet of water in them, and when the river went down the water went out. If I had pumped the water out of my cellar it would have come in again as long as the river was up. This water did not come from the surface but from the seepage. When the river is full the water out in that valley is much nearer the surface than when the water in the river is low. After we lost our water in the river the farmers in what we call the bottom lands complained that their corn crops were not as strong as when we had more water in the big river, because, as I say, this sub-irrigation, this water that came up near the surface, benefited the corn." (254.)

Mr. Harrison, of Colwich, says:

"The sub-irrigation rises and falls with the flow of the river. When the river is comparatively dry we don't see but very little of the sub-irrigation. . . . The sub-irrigation or underflow has a noticeable current from the northwest to the southeast." (273.)

Mr. Jurgensen, of Mount Hope, says:

"They generally say that the decreased flow has been because they take the water out of the river in Colorado. The loss of water has not affected the wheat crop very much, but it has affected the corn crop in dry years. The wheat crop don't depend on the underflow, but the corn crop does, in a dry season. It affects every crop that depends on the underflow. The underflow, of course, has gone down, and has gone down proportionately with the river itself. Our bottom lands have be-

come less productive because of the decreased amount of the underflow in a dry year. In a wet year it does n't affect it at all, but in a dry year it does, because the first years we raised corn it made no difference whether we got rain or not, we raised corn ; but since the underflow went down we don't raise any corn in dry years." (280.)

Mr. G. M. Shive, of Burrton, says :

"There is such a thing as an underflow ; it extends back as far as to Burrton and back to the Little river. It extended under the land where I first lived. I have had occasion to observe this underflow at Burrton lately. The Santa Fe has a large railroad well there, about twenty-two feet deep and twelve feet across. The underflow has gone down since the first years that I knew it. I am not able to answer, hardly, how much it has gone down, but I know the water does n't stand up so near the surface nor as high as it used to. It is six or eight feet lower. I have had occasion to notice whether the underflow rises or falls according to the rise and fall of the river. It does. When the river is high the water rises up in that well at Burrton, eight miles from the river. There is a current to this underflow there. It flows to the southeast. I observed it in that railroad well at Burrton. In one of those dry years, back probably eight or ten years ago, the well gave out, and the company went to work to dig the well deeper, and while they had the top torn off I had occasion to notice it a time or two. One time some others and myself were looking down in the well. The water was clear and we could see the bottom plainly, and while we were there we dropped down some little sticks and one thing or another on the water, and we could see it float gradually to the southeast. The lowering of the underflow on the first bottom lands has had the effect to cut the corn off badly, from want of moisture. During the first years after I went there it got its moisture from sub-irrigation mostly. During the last five or ten years it cannot get moisture from the sub-irrigation—not so much, any way." (300.)

Doctor McAdams, of Wichita, says:

"I had an idea that the water flowed to the southeast. I drove five wells on this lot. Four of them were at the corners of a twenty-foot square, and the fifth one in the center. I drove these wells sixteen feet deep—all the same depth. The men pumped the water out of them all, so that the water was clear, and I unscrewed the stock from the middle well and suspended one-half ounce of red aniline in a cheese-cloth, with a weight enclosed in it and a string tied to it, so that it would sink properly, and measured the depth from the top of the stock to the center of the perforated point of that tube, and I suspended this red aniline in the center of the pump, so that it would be in the center of the perforated tube. I had a man at each of the four pumps. I took a note of the time with my watch from the time the aniline was suspended in this pump, and had parties watching each one of the pumps that was working pumping the water. These pumps pumped just alike. They were the same size and the same depth. The colored water from the red aniline appeared at the southeast pump first, and, if I remember right, I think it took a minute and a quarter before the red water appeared at the southeast pump. It appeared next in the southwestern pump. The next red water appeared at the northeastern pump. The northwestern pump I don't think showed any red water, if I remember. I kept those four pumps going at the same rapidity for, I think, two hours. As I remember it, no red water appeared at the northwestern pump, and it was several minutes in appearing at the northeastern pump. It showed that the water flowed from the northwest to the southeast about thirty-five degrees. The pump at the southeast corner showed the greatest amount of red water or the deepest color, and the next one in amount of color was at the southwest corner. I don't remember how deeply the water was colored at the northeast pump. It appeared at the southeast pump the quickest and the color there was the deepest." (306.)

Mr. J. W. Shive, of Burrton, says:

"I am acquainted with what is known as the underflow. I mean that this valley—the whole of the valley—is underlaid by a stratum of water that flows parallel, or very near so, with the river. This underflow where I live extends clear across the valley, and, so far as my experience, knowledge and information go, it extends back to the bluffs on either side. It extends up the river in the same way. Within the years of my information and experience the underflow has lowered between three and four feet at my place. When I first came to the country I often dug surface wells, and dug into the ground for other purposes, and the water then was nearer the surface than it is now or has been since. When I dig into the ground now to the water, I find it about three and a half feet further down at the same point than it used to be during the same season of the year. The current of this underflow is parallel with the flow of the river, or nearly so. The surface of the underflow is level with the surface of the flow of the river, or, we always supposed, the surface of the water throughout the valley, as measuring to the river, parallel, is on a level, and that is a fact. The water in my wells rises and falls with the rise and fall of the river. It does this as far back as to the city of Burrton. I am acquainted with the Santa Fe well in the city of Burrton and saw it when they dug it. It was dug to furnish water for engines on the Santa Fe railroad. The water in that well rises and falls correspondingly with the rise and fall of the Arkansas river. The underflow through all that country has a current in a southeast direction. This condition extends up and down the river, as far as I know." (311.)

Mr. Lawrence, of Wichita, says:

"On my homestead the distance to water would depend upon the condition of the river. When the river was up bank full I would not have to go more than three or four feet. When the water in the river was practically as shown in exhibit A-1, on my homestead I should think it would be four or five feet to water. It would

depend upon the locality of places on the land; some places would be higher than others. I dug surface wells over there. There was evidence of an underflow there. Yes, there was an underflow under all this land in the bottom of the Arkansas river which I have described. The direction of the current of that underflow was parallel with the river—south over there at my place. Since about 1890 I have had a good deal of experience in digging cisterns and cellars and places like that, and I know the underflow is a good deal deeper than it was formerly; that is, we have to go further to get the underflow by several feet—probably four feet. When Wichita was built and they began building business blocks they could n't put cellars under the business houses. They would strike quicksand. They could n't dig cellars. Within the last ten or fifteen years they have built cellars under the buildings. They can go deeper now and still have a drier cellar than they could then. That is true all over the city and the valley." (323.)

Mr. Campbell, of Wichita, says:

"We seldom had a failure of crops in the first years, and have had many since. We did n't depend upon the precipitation of water; we got it from the roots, we thought. We based the value of our lands upon it. The sub-irrigation was stronger nearer the river when the river carried its normal flow of water, and weakened as it went back. I should say its influence was ten miles on either side, and practically the whole valley was under the influence of that sub-irrigation. I think the underflow has gone entirely. I do n't know how far it has gone; it has gone. I do n't think it gets back into the river after our neighbors in Colorado use it." (336.)

Mr. McCanless, of Wichita, says:

"The underflow in this valley is a kind of sub-irrigation—the water that flows beneath the surface—and I think it extends on the east side from Chisholm creek and on the west side about out to the slough. In this vicinity the average width of the valley between the foot-hills is about seven miles. As you go up the river

it gets wider. The underflow extends back to the foothills on either side. Since the years from 1870 to 1879 I think the underflow has decreased and fallen below the surface in proportion to the—the same as the decrease in the surface water, the water appearing on the surface. On the west side I dug several wells in the former years; that is, drove these wells, these pumps, and we could reach water from four to six feet. In recent years you would have to go much deeper than that. Now, that is true as far as my observation extends in the valley. In those early years we could n't dig cellars very deep, and I notice now the average depth of a cellar is much deeper than it possibly could have been at that time, because the water would come into the cellar. You can dig a cellar much deeper here than you could then. If you will examine those old buildings you will find scarcely if any cellars or basements under them. Under the buildings built within the last ten or twelve years they more or less have a basement or cellar. The residences have cellars now, too, but in the early days there were few of them had cellars. This was because the water was not more than three or four feet from the surface under the valley here. I think that was true on an average. You can dig a cellar most anywhere now without any danger of water coming into it. During the last ten or twelve years there has been but very little complaint of water getting into the cellars, except in our recent flood of July, 1904. I don't know of any complaint having been made about water being in those cellars dug within the last ten or twelve years until the last flood. During this last flood I know that water has risen in these cellars that never had any before. This was true generally. This is to a large extent true of those cellars where the water came in from below. The underflow rises and falls with the river.'' (345, 346.)

Mr. Caldwell, of Hutchinson, says:

''I mean by the 'underflow' the percolating water from the river out through the soil at either side. There is unquestionably such a flow as that known to this valley. If a man will dig a hole four feet square, as I

have done, away from the river, he can see it. He can dig it a mile or two away." (356.)

Mr. Edwards, of Kinsley, says:

"I think all our water that supplies these first and second bottom lands comes from the west. I would think it would be supplied from the same sources the river gets its supply from. The water under the first bottom land that I have spoken of rises and falls with the rise and fall of the water in the river. I think there is a visible and substantial current to this water that underlies these first bottoms, and that it flows in the same direction as the river. It flows northeasterly here. I think that is undoubtedly true. During those early years I think the crops grown and planted upon the bottom lands derived their supply of moisture more from the river than any other source. We had comparatively little rain then. I always had good alfalfa crops after I began putting them out. I have always felt that this alfalfa was supplied with moisture from the river. . . . The underflow has materially decreased. The level of the underflow must be considerably lower—is lower. There is no question about that. The lowering of this underflow has diminished very largely the production of alfalfa upon these bottom lands. It has had the same deleterious effect upon the production of other crops upon these bottom lands; perhaps not to as great an extent, but it has had a bad effect. If the underflow should be decreased and should go lower, I think it would still be worse. We had a better crop always when the river was running nearly bank full than when there was no water—when there was comparatively little water. We had a better crop then, I suppose, because the moisture permeated the entire surface of the ground. It is porous soil, and I suppose the water permeates through it. Whenever it is there I suppose it is circulating all through the soil. I know that to be a fact by experience. The soil is deeper when the river is full than when it is not. The soil in these bottom lands is rather light, porous soil, and the water from the river would make it moist. My alfalfa crops during the last few

years have been growing less and less every year, and the cause of that has been lack of moisture in the soil—the absence of water in the river. This decreased productiveness of alfalfa exists on other lands than those that I own, and extends the entire length and width of the valley, I think." (426, 427.)

Mr. Wellman, of Kinsley, says:

"I have had occasion to notice the underflow, particularly along the north side of the river, and also here in town. There is some current to it. It is enough so that you can notice it. I have noticed that in digging wells here it always clears on the upper side first. By the 'upper side' I mean up the river. When it is all stirred up when you are digging, and get done, it begins to clear, and that always leads me to think there is a current there. It goes out on the other side, because it clears on the up side first. The underflow is not now so close to the top of the ground on the bottoms as it was when I came here first. It is about two feet lower. We do not get water in the wells at the same depth we did fifteen or twenty years ago, by at least two feet, and in some places it is more." (436.)

Mr. Wright, of Dodge City, says:

"As to there being such a thing as an underflow, why, I have never heard that disputed but what there was an underflow. I mean that—in my opinion there certainly is an underflow. Along about twenty years ago they were building a ditch on the south side of the river, the head of which ditch was about twenty miles from Dodge City. Before they got to within seven miles of the head of that ditch the underflow was so great in excavating that it would swim the mules, and they had to take out a waste-gate about two miles this side of that—about nine miles this side of the head of the ditch—to let that water off before they could go on with the excavation. It would take the mules up to their bellies and deeper, and there was quite a flow to it, and they dug down and put in what they call a waste-gate to take surplus water off. The underflow extended as far back as the bottom would extend. As to how deep you would

have to dig in the early years before you found the overflow was of course in accordance with the amount of water in the river. Sometimes you would only have to dig one or two feet when the river was at all full, and as the river receded you would have to go deeper. The underflow rose and fell with the water in the river. I think there was undoubtedly a slight current to the underflow in the direction of the flow of the river—generally east along here—in an easterly direction. As to the effect the underflow had upon the production of crops upon the bottom lands, it certainly was a sub-irrigation to crops. These bottom lands during the early years were mainly natural meadows, and the crop we raised was hay. There is hay raised on these bottoms now, but I don't think one-half as much as formerly. This is, I think, from the lack of water or moisture from underneath. There is alfalfa raised on these bottoms now. They began raising it about twenty years ago. I think the alfalfa grew more luxuriantly then than it does now, perhaps nearly one-half more, because it had more moisture than it has now. There is not a great deal of alfalfa raised on the uplands. There is not much of the uplands that is suitable for alfalfa. Alfalfa raising is confined entirely to the bottom lands.'' (445.)

Mr. Beeson, of Dodge City, says:

''I am acquainted with what is called the underflow in this country. It is the water traveling under the ground—under the sand. It would seem like a sheet of water under the sand that you can dig down to and strike very easily. It extends back quite a distance, in a small way for a mile or two miles, very perceptibly. I think it flows back to the foot-hills and bluffs very perceptibly. I think it flows more to the south than it does to the north. It goes in a southeasterly direction. It seems to bear more east, of course, but it inclines to flow south, and in comparison with the general direction of the river is parallel with the river. I have noticed it in digging for water, digging wells; and in one case particularly, in 1884, I was interested in the building of a brick block here in Dodge City, and at

that time the underflow was so strong and effective that we placed water-closets in the basement of our buildings. We dug down to the quicksand and used it for years successfully in washing off the offal. It carried it off, and of late years we couldn't do it at all. The reason is the water is sunk away. There is no water there. It would stand up for two or three feet in that cesspool when we first built it. It is down here in the building. It is there to-day. . . . The South Side ditch, to the best of my knowledge, dried up because of the falling off of the underflow." (458, 467.)

Mr. Gallagher, of Dodge City, says:

"I was acquainted with the South Side ditch. Its source of supply was from the underflow." (476.)

Mr. Northrup, of Dodge City, says:

"That ridge where the general drainage begins to go north is somewhere from a mile and a quarter to a mile and a half at this particular point, right across here; and that condition extends very largely both east and west from Dodge City—on an average, all along the north side of the river from Cimarron to Ford; as to how far back it is from the river where this drainage goes north, I would say it is from one to four miles, and I think that every point between these two places named would come within that limit. As to what streams rise near the Arkansas river and then make a part of this drainage to the north, beginning up the river as far as Cimarron, I will say we have the Pawnee, the Buckner, the Sawlog, Duck creek, and Coon creek. Coon creek extends on down as far as Edwards county. Yes, sir, Pawnee creek is a part of the Pawnee river that enters the Arkansas river at Larned. . . . The waters just north from the stand-pipe in Dodge City run into Duck creek. Duck creek is similar to all the other western Kansas streams. It is deep banks and is a deep, narrow stream, and is fed by springs, and from the main spring at the head of it where it starts we have running water there continuously. . . . These springs I speak of are five or six miles from the Arkansas river and on down. Well, there are springs

clear on down the creek; in the hills back from the creek, a good many of them. For the first five miles here on Duck creek the springs are all on the south side and next to the hills, and the general slope is north and northeast, and then the creek takes a bend and runs almost directly north. Where that creek bends and runs north, then the springs are all on the west side of the creek from there on. . . . Coon creek rises something like four or five miles directly east of the Soldiers' Home, at Fort Dodge, and the Soldiers' Home is five miles east of here." (1926, 1927.)

Mr. Dickinson, of Larned, says:

"Yes, sir, I have had occasion to examine the underflow of the Arkansas river. . . . We would set barrels, as Mr. Johnson states, down in the ground, one or two barrels, and make sticks to go down in the ground to reach these barrels. The water in the ground when it was full was at the top of these barrels or above them, according to how deep they were down in the ground. Over on my place, where I had the first garden, I had two of these barrels, thirty inches each, one on top of the other, and when the water was low or scarcely a small stream running in the channel of the river the water would be hardly so that you could get a bucketful. That was used for irrigation and for watering our stock. When the river was high these barrels were full and overflowing. As to how far back from the river I noticed this, I will answer, that was about seventy rods where those barrels were first put in. As to whether I have noticed the influence of the river upon the level of the underflow back farther than that, I will answer, farther back than that, over the ridge, there was a cattle camp. The year I came to Larned, in 1875, they had a place dug twelve feet deep and carried out the dirt where they had the steps running down to it, and over in what we call Pickle creek valley that water would rise. I have seen it at the top of the barrels and then again I have seen it when you could n't dip half a bucketful. As to what caused it to rise and fall in the barrels, well, I have noticed that when the river was high it was high in those barrels, and it was low in the barrels when the river was

low. As to whether the river would rise or fall before a corresponding rise in the barrels, I will answer, following the rise in the river it would rise in those barrels. When the river would fall it would fall in those barrels. As to what called my attention to the fact that this underflow had a current, I will answer, in several instances. . . . As the water would come in and fill up to the level of that water you could drop a little stick on to the upper side and it would glide right across to the lower side where the water passed out. As to what I mean by the upper side, on the upper side—toward the upper side of the stream—toward the southwest. The river runs from southwest to northeast here in this section of the country. The direction of this current across this well was almost equal to the direction of the river and was parallel with the river. Yes, sir, I have had occasion to notice a current to the underflow there and at other places. . . . It was near the road, nearly a mile from the river. Five or six years ago this spring the secretary of the Horticultural Society, at Topeka, was at my home here, and we were talking about the underflow, and it was something he never had heard of or seen, he said. He did n't know what it was. I was trying to explain it to him, and I said, 'By the way, the river has raised last night, and probably I can show you what I mean by it.' We walked through the orchard and so on out to where this trench was dug. I told him there I had seen the water flowing through that, and we would go and see. The water had raised the day before, probably thirty hours previous to our going out there—twenty hours—and we walked out to this place, and when we got there there was water in it, standing. We stood there talking about it, and we could see the water rising, and he says, 'Look at that; the water is all coming into it at this end—into the west end.' Well, that is what I saw myself, but he called my attention to that. And while we stood there I placed a stick in it. We stayed there and timed it for half an hour, and it raised two inches in that hole, and he says it is rising up there, and I says there is a current. I was chewing tobacco, and spit tobacco juice into it, and we could see it pass from the

west end, up the stream, down to the lower end and out of sight. We stayed there until that water raised two inches in the stream." (1984, 1985.)

Mr. Worrell, of Larned, says:

"As to what influence the flow of the Arkansas river has upon the water of the Rattlesnake, I will say I only know the fact that when there is a good body of water in the Arkansas river there is more water at the Rattlesnake than when the water is low in the Arkansas river. As to whether that is true, yes, sir, that is true, absolutely. I know that of my own knowledge. Yes, sir, that same fact is true in regard to Coon creek. That is absolutely true." (2019.)

Mr. Chapman, of Great Bend, says:

"Yes, sir, the water would come up in the cesspool after the water rose in the river, and when the water went down in the river it lowered in the cesspool. I observed that, yes, sir, and that is three-quarters of a mile, or a mile about, from the river." (2040.)

Mr. Miller, of Great Bend, says:

"I know there is an underflow—I know that. As to what makes me think so, I live right over this divide here, and when the river rises the water rises in my cellar. That cellar is just a block north and a block west of the Commercial club rooms, here in the city of Great Bend, and it is just about a mile from the river. Yes, sir, I say that when the river rises the water comes into my cellar, and that does not run in from a rainfall from the surface. It runs in from beneath—the underflow does. The other cellars are about all that way, all over the city." (2046.)

Mr. Unruh, of Great Bend, says:

"Nobody could raise corn in a dry season without the underflood." (2051.)

Mr. Lewis, of Great Bend, says:

"As to which side of the Rattlesnake there are springs, I would say, well, the springs from a point south

of Lincoln township for twelve miles west, as far as I have observed, all are on the north side. They are on the north side of the Rattlesnake. In fact, I never saw any that were not. But I am not familiar with the Rattlesnake west of Lincoln township, Stafford county; and in that region all the springs were on the north side and west side, yes, sir. As to how I account for that, I account for that that the Rattlesnake is made up from the seepage waters of the Arkansas river—from the underflow. As to what evidence I have of that, well, because it rises, without regard to the rainfall, with the rise and fall of the Arkansas river. Yes, sir; it does do that." (2055.)

Mr. Smith, of Sterling, says:

"As to the effect the lowering of the water in the river has had upon the underflow, the underflow is from two and a half to three feet lower than it was in the early days here—I would guess two and a half to three feet—and that condition has continued from twelve to fourteen years, somewhere along there when it commenced to sink. There are several facts I have in mind that lead me to make this statement. In the first place, in the early days whenever we would have high water down at the river, whether we had any rain here at all or not, if there was heavy rains above it would raise the water in the river and send the underflow out here to the city and fill pretty nearly every cellar in town. It don't do it any more. About twenty years ago, as I have stated to you, we dug the basement for our bank building, and we went down and tapped the water, and kept tab on that for probably three or four weeks before we would undertake to allow our foundation to be built, locating the mark of the underflow. Now, about four or five weeks ago we put in a cesspool behind the bank, and we went down there. While we were digging that we undertook—that was at the time when there was no high water, that river was at normal condition—and we undertook to guess about or to measure up about the distance of the underflow as we found it then when we went down to it, and the way it was when we laid the foundation on the same lot, we

figured it as being three feet lower than it was twenty years ago. . . . Yes, sir, there is a lake or pond between the city of Sterling and the river. It is what we call Silver lake. It is nothing but a slough. Why, the lake in the early days here would average probably two and a half to three feet in the deepest place. It was deep enough so that ice-houses were erected along the bank and ice was cut there and stored right along the bank of the lake.'' (2069, 2070.)

Mr. Swartz, of Sterling, says:

''Yes, sir, I think I know what they mean by the underflow from what these other men have talked. Oh, yes, we have talked it over for years. As to the underflow in the bottom lands being as near the surface for the last ten or twelve years as it used to be, I will say I don't think it is. My cellar across the corner over here used to have water in it in periods, and it has n't had any in it now for years.'' (2076.)

Mr. Vincent, of Hutchinson, says:

''As to what effect the different volumes of water in the river have upon the level of the water beneath any portion of the city of Hutchinson, I will say the water rises and falls as the water rises and falls in the river. As to how far back from the river that condition extends, I will answer, I only know back some five miles, of my personal knowledge, and it does produce that effect back five miles from the river, yes, sir. . . . Yes, sir, we have wells over there at the salt works, of which I am manager. I think one of our works is two and a half miles from the river. As to whether there are many wells at this salt plant there from which we can ascertain that the level of the water rises and falls, I will answer, certainly there are. We have to supply a large amount of fresh water in the manufacture of salt and in the salt wells. We have open wells dug, about fourteen to sixteen feet across, and it is very easy to see the rise and fall of the water in those wells, and we have noticed it. As to how the rise and fall of the water in those open wells at our salt plant corresponds with the previous rise or fall of the water in the river, I will

answer, well, it corresponds exactly. I mean that when the water comes up in the river the water will rise in those wells at our salt plants, two and a half miles back. And when the water goes down the water in the wells sinks." (2087, 2091, 2092.)

Mr. Ploughe, of Hutchinson, says:

"Yes, sir, I know something about what is known as the underflow. As to how far back it extends from the river, I will say that to my knowledge it extends back to our irrigating wells. I have no absolute information further than that, but I know it extends to our irrigating wells, and they are about a mile and three-quarters directly north of the river. As to what effect a rise and fall of the water in the river has upon the underflow at that distance, I will say the water rises in our irrigating plant—in our wells—as the river rises, and it goes down or recedes in the well when the river runs out or when the water runs out of the river; and that is regardless of rain, yes, sir. . . . As to how the land slopes a short distance from the northeast bank of the Arkansas river towards the Little river, I will answer, the ground slopes toward the Little river down from the big river. I think the Little river, at the place I know it, is a perennial stream. As to what extent, so far as I know, the Arkansas river affects the Little river, I will say, well, it feeds the Little river as it feeds Cow creek, but not to the same extent, because it has further to go." (2096.)

Mr. Hartford, of Medora, says:

"The Little Arkansas river is ordinarily a small stream. No, sir, it never has gone dry in my time. I have never seen it dry. I have been there since 1872. It never goes entirely dry. Where the Little Arkansas runs through my farm it is lower than the bed of the Arkansas river at a corresponding point across. As to which way the country drains between the Little Arkansas and the Arkansas across there, I will say it drains into the Little river. As to how much lower the Little Arkansas is at Medora than the Arkansas river is at Hutchinson, I will say it is forty-five feet lower, according to the Rock Island

survey. It was something strange to us for years and years what caused the changes in the Little Arkansas river. As to what these changes were, why less water than had previously flowed in the Little river. As to what effect the condition of the water in the Arkansas river has upon the water in the Little Arkansas river when there is no rain to affect either, I will say the Little river is always lower. If there was no water in the big river there would n't be as much in the Little river. As to whether the amount of water in the Little river corresponds with the amount of water in the Arkansas river, I will say I should judge that it does correspond to some extent; yes, sir. As to there being springs along the Little river, I will say, yes, sir, there used to be a great deal more than there is now. These springs are on the south side of the Little river altogether. Men in my business used to think it was one of the finest streams for stock there was in the country on account of the good water it afforded. That water we concluded came from those springs. We could see that. Of course you could see it, but we did n't know——. Yes, sir, the water from the Little river was fed by these springs; and those are all on the south and west side of the Little Arkansas river, yes, sir." (2099, 2100.)

Mr. Bigger, of Hutchinson, says:

"As to whether the water in the river affects the cellars in the city of Hutchinson, well, yes, it undoubtedly does. In my own case, I have a cellar here. Just two weeks ago, when the river was full, my cellar, the cement on it was a little defective, and it come up three or four inches of water, may be five inches, in the cellar, and as soon as the water went down—that water was just as clear as spring water, too, and it came in through the bottom of the cellar—and when the river went down it went away, all except little holes in the bottom of the cellar where it couldn't get out. No, sir, the water in my cellar was not affected by any local rain. The rain never affected it when the river was low. It is the general pressure of the underflow that caused it. My residence is on Sherman street east, No. 309." (2102.)

Mr. Collins, of Hutchinson, says:

"Yes, sir, I am familiar with some lakes or pools that in the early days had water in them constantly and have changed since that time. Well, here is Brandy lake, located down here ten or twelve miles east of here, that used to have considerable water in it. It used to be quite a lake, and there have been quite a good many fish in it, and I think some six or eight years ago it began to dry up and those fish began to die in it. I think that lake was fed from the river entirely. Of course, the surface water that fell around it—the rain—put some water in it, but the principal thing that kept it up was the Arkansas river. As to whether the amount of water in the lake responded to the amount of water in the river, yes, sir; when the river was high there was plenty of water in the lake, and when the river was low the lake began to diminish. As to other lakes and pools in the same condition, I have a fish-pond on my place right due north of here in the bottom, right at the foot-hills, and the water dried up about six or seven years ago." (2116.)

Mr. Watson, of Kinsley, says:

"That is the way we determined the question of whether there was an underflow or not, and we determined in our own minds that there was an underflow. As to the rise and fall, this well would rise—well, say, for instance, at a time of flood water in the river—at the time we put this well down there was no water in the river whatever; that is, when we got down to the twelve feet, only possibly a small running stream. At the time we put the well down we got into the water twelve feet. Now, if the river would fill, that well would rise from one to two feet, according to how full the river was. If the river got bank full there would probably be from a foot to a foot and half rise in this well. That was nearly a mile from the river." (2121.)

Mr. Mead, of Wichita, says:

"Where the city of Wichita is built the underflow extends to the high land—to my knowledge, to the high land on the other side of what we call the big slough,

probably four miles or perhaps more. On the east side it extends, to my knowledge, on Douglas avenue and Central avenue, a mile and a half; or perhaps farther, but I don't know that of my own knowledge." (2135.)

Mr. Mathewson, of Wichita, says:

"Yes, sir, I am familiar with what is known in this country as the underflow. As to how far back from the Arkansas river the underflow is perceptible, I will answer, why, I have dug wells for irrigating purposes a mile and a half from the river due east from here, right on my home ranch where I live now, within the corporate limits of the city of Wichita. When I dug those wells, or that particular one there which was a larger one than any of the others I ever dug, it was rather a low stage of water, I think, and it was rather a high piece of ground that I dug the well on. I think it went down about eight feet to water. I went to work and put in frames and curbed it, or drove down plank all around, and sank the well probably four feet. I took the sand out to make it as deep as I could, to get the water out. I noticed that when the river would rise it would rise right up in that well, and lower just according to the height of the river It would be lower when the river went down, and when the river got so there was no flow in it there was no water in the well. That is almost due east on Central avenue, and just half a mile north of Douglas avenue." (2152.)

Professor Slichter, a witness introduced on behalf of the intervenor, spent a month in the Arkansas valley in 1901, near Dodge City and Garden City, the most of the time being near Garden City. During the year 1904 he spent about two months making investigations and experiments to determine the amount and availability of the underflow, and to determine whether it would be practicable to recover sufficient water by a pumping plant for irrigation of lands adjacent to the river and a few miles above Garden City, to be installed under the provisions of the reclamation act. In making these investigations, Professor Slichter observed and noted the

level of the underflow in a number of wells, and the facts he noted were exactly in harmony with the facts testified to by witnesses introduced on behalf of the complainant. The rise of the water-level in a well 400 feet north of the river was noticed three hours after the flood in the river commenced, on June 22, 1904, and lasted about forty-eight hours, and as long as the flood lasted, and reached its height three hours after the flood had reached its height (1342). Upon this point Professor Slichter says:

"Yes, sir, the 400-foot well began to rise within three hours of the beginning of the flood in the river. As to how to account for that, I will answer that that is a very common fact. The ground-water wave is changed very rapidly by any changed pressure at any place. The wave is transmitted with a fairly high velocity, similar to the observations we frequently make where a tide in the ocean affects a well a considerable distance from it, with a lag of only a few hours. . . . If the flood of June 22, lasting two days, had lasted two months, or thereabouts, at practically the same height that it reached, it would probably have kept that elevation in the 400-foot well north of the river at the observed maximum height. It would retain it there. Inasmuch as I observed no influence of the flood on the well 1120 feet from the river, I have no adequate means of judging what influence it might have had upon that well had the flood lasted the suggested two months. This flood lasted only forty-eight hours. If that flood had lasted two months it might have extended and influenced the ground-water level back farther from the river than the flood that lasted forty-eight hours (1343). . . . As to the question that if the river should flow bank full whether the ground-water in the strip I have referred to would be raised, I should say it might be raised if the river should flow bank full, because for a short distance on the north side of the river the ground-water is lower than the level of the flow of the water in the river, and if the river should practically flow two feet deep the year 'round, although it might be low at

some particular time of the year, this level of the ground-water might be raised (1346). . . . If the river should flow practically ten months out of the year with a good, substantial flow, from one to two feet deep, I expect that flow in the river would contribute to the raising of the level of the ground-water near the river." (1346.)

Professor Slichter also made observations at Sherlock, about seven miles west of Garden City. The rise of the water-level in a well 500 feet south of the river from the flood of July 27, 1904, was 4.3 feet in the river, and 1.4 feet in the well, and was noticed within eight hours after the flood commenced in the river, and reached its maximum in 51 hours after the flood in the river commenced (1360). The rise of the water-level from this same flood was also noticed in a well 900 feet south of the river, and amounted to 0.7 of a foot in the 15 hours after the flood commenced in the river (1361). This flood reached its height at five o'clock P. M. on the 29th day of July, 1904, and lasted four days, and fell very slowly (1361). He further says that the level of the water in the test wells was lower than that of the water in the river (1360).

Professor Slichter further says:

"I think I made two statements in answer to questions propounded by counsel for the state of Colorado, yes, sir, that during the flood the waters flowed at a greater angle from the river than when there was no water in the river. That is true at the stations near the river. I gave the angle of change at the station 300 feet from the river: 43 degrees difference; that is, 43 degrees farther away from the direction of the channel during the flood than when there was no flood. I think that the date of that flood was August 7. Yes, sir, I had one well at 1100 feet and one at 1730 feet, both on the south side of the river. There was another one 1100 feet from the river, but 1000 feet up stream from the other one, making a triangle. Yes, sir, the level of the

water in those wells was below the river. No, sir, it did not at that point slope from those wells to the river." (1359.)

As to the velocity of the current of the underflow, Professor Slichter says:

"The farthest well that we sank ourselves was at the edge of the sand-hills, about two miles south of the river. We found a current to the ground-water in all of the wells that were put down, and the average current was eight feet per day. The maximum velocity of this current was 22.9 feet, at Sherlock, 700 feet north of the river, seven miles west of Garden City, and at a depth of 28 feet. The minimum velocity of this current was at Deerfield, being $1\frac{1}{4}$ feet in twenty-four hours, 1800 feet south of the river, at a depth of 21 feet." (1341.)

During one of these floods, Professor Slichter observed that the current of the underflow changed its direction forty-three degrees away from the general direction of the river, and this observation was made 300 feet north from the river bank. Professor Slichter made an estimate that, at his principal station, two miles west of Garden City, in the area included by the river channel and a line 2500 feet north of the river, about two-thirds of the ground-water was contributed by the rainfall and about one-third was contributed by the floods in the river, if the time be made to include the flood in the river (1347). Of course, then, during the times when there was no rainfall on the uplands or within the valley and when there were no floods in the river, the only source of supply to keep up the level of the underflow would be the river itself.

Professor Slichter made some observations and experiments in the Arkansas valley above Wichita, and found two depressions corresponding to two creeks on the west side of the Arkansas river, and a depression on the east side due to the Little Arkansas river. He also

found that, in between the Little river and the Arkansas river, north of Wichita, it slopes toward the Little river, and that this strip widens toward the north and as far as his observations went. He found that on the township line the bed of the Little river was fourteen feet below the bed of the big river, and says: "The Little river does not feed the big river because it is lower than the main river." (1347.) He also found that from a chemical standpoint the water of the underflow in this strip between the Little river and the Arkansas river was substantially the same in character as the water in the Arkansas river (1347). He then says: "As to what that shows, it is very strong evidence that the ground-water in that strip was being contributed to by seepage from the Arkansas river." (1347.) Professor Slichter found that the water-level in some of the wells in Garden City was above the level of the water in the river, and in some of them the water-level was below the water in the river. In some places he also found that the slope of the ground was toward the river on the one side and away from the river on the other.

Mr. Willard D. Johnson, on page 647 of his article, "On the High Plains and their Utilization," referred to by him in his evidence (1226), says, speaking of the Arkansas river near Garden City:

"The dip of the water plane is toward it on the north, and away from it on the south. From the mountains to this point, however,the dip on each side of the valley is streamward; to the east, for a considerable distance, it is on each side away; that is, to the westward the river runs below the upland level of the ground-water. The ground-water there contributes to its flow. To the eastward it runs above, and is depleted in turn. In the neighborhood of Garden the river receives contribution on the one side, and on the other loses."

On page 649 Mr. Johnson further says:

"The Arkansas, for a short distance near Garden, as we have seen, contributes to the ground-water on the one side, but receives drainage on the other."

It may be true that in some places above Garden City two-thirds of the contributions to the ground-water may come from rains and only one-third from the flood in the river, but it must be apparent from the formation of the valley itself that below Garden City, and during times of the year when there is neither rainfall upon the uplands nor a flood in the river, nearly the whole of the contributions to the underflow throughout the Arkansas valley must come from the river itself. Below Dodge City it would be practically impossible for the underflow to feed the river, because the level of the river is higher than the level of the underflow on either side. From Dodge City to Wichita the streams on either side of the river, flowing through the valley, are below the bed of the river itself, and must get their contributions, except in times of rain, from the waters of the main stream. That the level of the underflow rises and falls according to the rise and fall of the river was testified to by every witness who lives in the Arkansas valley, and this fact was so commonly known that it is beyond dispute, and was no longer considered worthy of special mention.

The level of the underflow within a few miles of the Arkansas river, in comparison with the level of the water in the river, was determined by a number of surveys and measurements made by Mr. Brown, the former surveyor of Sedgwick county and the present city engineer of the city of Wichita. The results of these surveys and measurements are shown by complainant's exhibit No. 62, which is a map of the surveys near Mount Hope, and by exhibit No. 63, which is a map of the surveys near Colwich, both in the northwestern part of Sedg-

wick county, Kansas. These measurements show that the water back from the river five or six miles is on a level with the water in the Arkansas river at a point in the river at right angles to the wells measured. Of course, the water reaching these wells by the underflow from the river would not leave the river at right angles, but would leave the river some miles above that point, and these wells would then be much lower than the level of the river at a point where this water would leave the bed of the stream.

That the underflow receives some supply from the rainfall on the uplands beyond the valley on either side may be true, and the exact amount of contributions from the rains on the uplands is immaterial. One thing is certain, since the uplands have been largely broken up and put under cultivation the run-off must have largely diminished, and these uplands have been largely broken up within the last twenty years. In their natural state these uplands were covered with a smooth, solid buffalo sod, and the greater portion of the rain that fell on these buffalo sods immediately ran off to the river, and but a small portion of it penetrated the ground and found its way to the underflow beneath. Since these sods have been broken and the lands cultivated, a much larger portion of the yearly rainfall is absorbed where it falls and finds its way into the underflow beneath rather than the visible flow of the river. This being true, the underflow during the last fifteen years should have received much larger contributions from the rainfall on the uplands than during the early years, and the level of the underflow should consequently be higher. On the contrary, however, the level of the underflow is about four feet lower throughout the whole Arkansas valley than it was twenty years ago (311). The loss of water in the river itself has been so excessive in the last fifteen years as to

overcome this additional amount of supply to the underflow from the more largely absorbed rains on the uplands, and has materially lowered the original level of the underflow throughout the whole valley. This decrease in the visible flow of the river has more than counterbalanced the increased supply from the rains upon the uplands. From August, 1903, to the 3d day of May, 1904, the Arkansas river was absolutely dry between Coolidge and Dodge City (575). On the 3d day of May, 1904, the flood made its appearance at Coolidge, which amounted to 10,000 cubic feet per second at that point (629). At Garden City it measured 8000 cubic feet per second, at Dodge City 3000 cubic feet, and at Hutchinson 1000 cubic feet (630). This loss cannot be attributed to evaporation, for it occurred within two days' time; 7000 cubic feet per second were thus absorbed between Coolidge and Dodge City, and 2000 cubic feet per second in addition were added to the underflow between Dodge City and Hutchinson. It is in the testimony that seventy per cent. of the amount of these floods crossing the Kansas-Colorado line is absorbed by the time it reaches the city of Wichita (644, 756). All of these measurements just mentioned have been made within recent years and since the diversion of the water in the state of Colorado. The year 1904, subsequent to the 3d day of May, was one of the wettest years ever known in the Arkansas valley, both in the amount of local rainfall and in the amount of water flowing down the river from its upper reaches. The excessive and continued floods in New Mexico and Colorado not only kept the tributaries supplied for weeks at a time, but even interfered with the traffic of the railroads, flooding the city of Trinidad, and producing the Eden wreck in Colorado, one of the severest in the history of casualties. It may be true that subsequent to May, 1904, the level of the underflow

throughout the Arkansas valley has risen, but excessive floods disappearing within a few days do not permanently raise the level of the underflow like the continuous and even flow of the river as it was during the early years. Constancy of the supply is more to be desired and more useful in the Arkansas valley than an excessive flood, bringing destruction not only where it rises, but throughout its whole course, until it is dissipated in the larger waters below.

The presence of the underflow is coextensive with the valley itself, and, according to the observations of innumerable witnesses, its effect is felt as far back as the foot-hills on either side of the river. The soil in the valley is porous, the quicksand and gravel, where the underflow is found, becoming somewhat coarser further down the valley, and the current of the underflow is largely unobstructed. The underflow itself furnishes the main supply of water for the Pawnee river, Coon creek, the Rattlesnake, the Little river, and the Cowskin.

In the early years this underflow in the Arkansas valley furnished the sub-irrigation, which was the most permanent supply of moisture for the maturing of crops during the dry portions of the year. For this reason the Arkansas valley became known even at the earliest times as the great corn-producing region, and between Sedgwick and Hutchinson was known as "Egypt," because crops of corn were there raised and matured during the dry years, when the crops on the uplands withered and died (2158, 2195). When Mr. Campbell drove from Salina, about the year 1880, across to the Arkansas valley, during the dry season, he found the Arkansas valley perennial in its greenness when the uplands were parched and burned (2280). This condition of the Arkansas valley was noted and caused constant comment, and the unvarying reason was assigned that its fertility was supplied by the underflow from the Arkansas river

(2198). The witnesses who have raised corn in the Arkansas valley for the last thirty-five years have uniformly testified that during the dry portion of the year the corn roots were moistened from the underflow beneath, and that this underflow not only added to the value of their lands in general, but to the yearly production of their crops. They might depend upon the rainfall when the rainfall came, but when the rainfall did not come, the underflow was found supplying the needed moisture.

That the level of the underflow has been lowered within the last fifteen years throughout the entire valley was testified to by more than a hundred witnesses. Since about the year 1890 the underflow has gone down from three to five feet throughout this area of 2500 square miles; wells have had to be lowered; cellars that were damp or were full of water when the June rise came, in the early years, have since become dry; foundations of buildings are now put down three to five feet deeper than was possible in early years in all the cities from Wichita to Syracuse; the lakes or ponds that were supplied by the underflow in the early years have gone dry (575), and the pond at Garden City, that in the early times furnished fish in the summer and ice in the winter, and that was a convenient resort for the purpose of swimming, is now dry and grassed over, with the exception of a few square rods (567, 575). Silver lake, near Sterling, also went dry, and in order to continue a sufficient amount of water for the cutting of ice in the winter, it has had to be deepened by artificial means (2070). Brandy lake, ten miles below Hutchinson, has been without water for ten years (2116). The springs that fed the fish-pond on the premises of Mr. Keller, below Arkansas City, flooding the pond, failed and the fish died (376). The South Side ditch, near Dodge City, which was dug

before the depletion of the river above, and which derived its waters from a basin or reservoir dug down into the underflow, had no longer a supply of water and has become filled up with the drifting sands (454, 460). The sub-irrigation for crops throughout the whole Arkansas valley has disappeared from a serviceable distance, but may still be found four or five feet lower than its former level. The presence of this underflow throughout the Arkansas valley during all the early years was one of the unfailing sources of its fertility and productiveness, giving an additional value to its lands, inviting early settlement and extensive cultivation, and the lowering of this underflow, and the injuries following as a consequence, is one of the complaints in this action now before the court.

SEC. 11. The Settlement of the Arkansas Valley.

The lower part of the Arkansas valley was surveyed by the United States government in 1867, and the upper part of the valley was surveyed in 1872. The first settlements in the valley were made at or near the city of Wichita in 1868. The post-office was established in 1869 and some lands were entered by that time. Complainant's exhibit No. 4 is a record of 500 tracts of land bordering on the Arkansas river between Arkansas City and Hutchinson, giving the date of entry and the date of patent of each tract described. All these lands were patented prior to August 1, 1876, when Colorado was admitted into the Union, and by far the greater number of them were entered between 1870 and 1872 and patented about two years later.

A ferry was established across the Arkansas river at Wichita in 1870, and the first bridge was built at that place in 1872. The Santa Fe railroad was built through the whole length of the valley west of Wichita about the end of the year 1873, and nearly all the bottom lands in

the west half of the valley were entered by the year 1880. The greater portion of the eastern half of the valley was settled between 1868 and 1875, and the great portion of the western half of the valley was settled between 1873 and 1880. The tract of land owned by the state of Kansas in Reno county and used as an industrial reformatory was entered prior to August 1, 1876; and the tract of land in Ford county owned by the state of Kansas and used for a soldiers' home, prior to the 13th day of June, 1889, was in the possession of the United States government, and on that day was deeded by the government to the state of Kansas.

SEC. 12. The Crops Raised in the Early Years.

The crops raised in the Arkansas valley in the early years were principally corn, hay, and vegetables, and these crops were gradually followed by oats, rye, barley, millet, cane, and Kafir-corn. Wheat is largely grown in this section of the state, but it is confined almost entirely to the uplands, and but little wheat is grown in the Arkansas valley. Fruit of all kinds is now extensively grown, and this is especially true of Reno and Sedgwick counties, there being at the present time more than a million apple trees within a radius of five miles of the city of Hutchinson. During the early years of the settlement of the Arkansas valley, the natural hay crop was an important and profitable one, and many square miles of the Arkansas valley were continuously mowed for many years before Colorado became a state (445). Large contracts with the government were filled from the meadows along the Arkansas river (447). In the more recent years alfalfa has been grown very extensively, yielding a sure profit. From Kinsley to the lower end of the valley in the state of Kansas, the one staple crop throughout all the early years was corn, and for the raising of this crop the soil was peculiarly

adapted and the seasons were well suited. There is, however, always a dry season of the year in western Kansas, and often during the months of July, August and September there is not sufficient rain for maturing a good corn crop, or for the maturing of other crops whose roots do not penetrate the ground to any great depth. The soil of the Arkansas valley is of such natural fertility that the annual yield of these crops is in proportion to the amount of moisture and its proper distribution. During the early years, from 1870 to 1890, through this dry season of the year, the underflow or subirrigation of the bottom lands always supplied the necessary additional moisture, so that crops of corn, hay and vegetables were raised on the bottom lands whether the rain was sufficient for their maturing or not (273, 280, 283, 284, 288, 294, 303, 312, 323, 336, 341, 346, 357, 365, 376, 393, 402, 426, 427, 433, 436, 440, 445, 458, 476, 484, 487, 543, 550, 554, 560, 567, 577, 584, 607, 611). Even during those years, or parts of those years, when corn was dried up, burned by the sun or fired by hot winds in other parts of the state, and on the uplands in this part of the state, if any were planted on the uplands at all, this sub-irrigation in the Arkansas valley supplied the necessary moisture during the dry season of the year for the maturing of the crops. The lower part of the Arkansas valley, and especially in the counties of Sedgwick and Reno, for miles around this particular section, was known as "Egypt," because the crops of corn there grown were both plenteous and certain. In 1874, the most disastrous year that the Arkansas valley, or even the state of Kansas, has ever known, it was grasshoppers rather than lack of moisture that caused the destruction of the crops. In giving their testimony, the farmers who have cultivated the bottom lands in the Arkansas valley twenty-five years or more would reply to questions and assert

that they depend upon rainfall for the raising of corn, but they would also add that, during the months when the corn was maturing, if the rainfall was scanty or not well distributed, the sub-irrigation furnished by the underflow supplied the necessary moisture during this period; so that it was literally true that they could raise corn whether they had rain or not during the months of July and August. In those early years the crops in the Arkansas valley were often found green and growing during those months, when the uplands near by and other sections of the state further distant were bare and cropless. The second bottom lands, lying just back of the first bottom lands and from two to six feet higher, have been found well adapted to the raising of alfalfa; but the raising of alfalfa in the Arkansas valley came later than the raising of corn, hay, and vegetables, but the certainty of this alfalfa crop was based upon the same unfailing sub-irrigation. As long as the sub-irrigation was undisturbed alfalfa raising increased in acreage and profit. The apple culture is somewhat similar to the cultivation of corn and the raising of alfalfa. The roots of the apple trees penetrate the loam until they are supplied with the necessary moisture from beneath to carry them through the dry season, when the leaves are unsupplied by moisture from the atmosphere (2093). Some years when the rainfall in the aggregate is sufficient for the maturing of the ordinary crop, still it may not be well distributed, too much falling in one part of the season and too little in another part. When, however, a scanty rainfall during the months of July, August and September was supplemented by the sub-irrigation at from two to five feet of the surface on the first bottom lands and at from five to ten feet beneath the surface on the second bottom lands, the crops that were sown were brought to maturity and the yield was

large and satisfactory. From the settlement of the Arkansas valley, in 1870, to its development in 1880, there were boundless opportunities for agricultural pursuits, and there was great assurance of agricultural profits and agricultural permanence. The soil is rich, deep, and exceedingly fertile; the climate is salubrious and healthful; the elevation is desirable; and near-by markets followed the great productivness of these early years (337).

The raising of corn extended up the valley as far as Dodge City, while the raising of wheat and alfalfa, barley, oats, rye and vegetables extended the whole length throughout the state of Kansas. From Dodge City to the Colorado line, the rainfall, however, was too light to make cultivated crops either certain or profitable, and in the year 1879 the early settlers began supplementing the scanty rainfall by a series of small irrigation ditches. These ditches extended from the state line on the west to Dodge City on the east, and from 1880 to about 1888 the agricultural prospects of the lands under these ditches began to be very bright, and the west end of the Arkansas valley was deemed to be a fair rival of the east end of the valley. Garden City became one of the most prosperous and growing cities of Kansas. The ditches were well supplied with water; the yield from the irrigated land was bountiful and certain, the natural meadows along the first bottoms being supplemented by equally profitable meadows of alfalfa on the second bottoms; fruit began to be grown in great abundance, and the whole Arkansas valley for 350 miles was rich, fruitful, and prosperous. Its newness had worn off; cabins were replaced with residences; towns had grown into cities; the territory had been gridironed with railroads; and before 1888 no one had dreamed that this prosperity could be interrupted; that the yield of the bottom lands would be lessened; that

many cities would become towns again; that a large acreage would remain uncultivated; that the flow of the river would be decreased; that the level of the underflow would be lowered; that the irrigation ditches would be dried up by the depletion of the waters in the Arkansas river, across the state line to the west, within the next five years.

SEC. 13. The Arkansas City Water Power Company.

Through the southern portion of Cowley county, Kansas, the Arkansas river flows in a direction nearly due south, it then bends to the east and flows nearly due east for a few miles, and then bends south and enters the territory of Oklahoma. The Walnut river flows into the Arkansas river at this point where it bends south. In this bend of the river, on the east and north side and west of the Walnut river, is located the city of Arkansas City. This town was laid out in the early '70's, and on the 17th day of December, 1880, the Arkansas City Water Power Company was chartered and organized (complainant's exhibit No. $6\frac{1}{2}$), (415). This corporation was chartered for the purpose of constructing a canal from the east bank of the Arkansas river through the lower part of Arkansas City, which emptied into the Walnut river just above its mouth. The construction of this canal was commenced on the 28th day of February, 1881, and was completed in one year from that date, and the water was immediately turned into it (416). Exhibits Nos. 7 and 8 (416) are photographs of this canal taken during the year 1881. This canal was constructed for the purpose of furnishing water power for milling and manufacturing purposes, and was at once a success, and laid the foundation for the growth and prosperity of Arkansas City. By the construction and operation of this canal Arkansas City had an advantage possessed by no other locality in

this part of the state of Kansas, furnishing cheap and continuous water power. This canal was $5\frac{1}{2}$ miles long, 39 feet wide on the top, and $4\frac{1}{2}$ feet deep, with a total fall of 24 feet (418); its total cost being about $150,000, with an estimated power capacity of 1000 horse-power, and for some years actually furnished 425 horse-power to the mills and factories built upon its banks (420). The Speers flouring-mill was erected in 1881, and cost $20,000; the Ayers flouring-mill was consolidated with the Arkansas Milling Company's mills, and all cost $125,000; the Landis mill cost $30,000; the electric-light plant cost $25,000; the Kirkwood wind-engine mill cost $15,000; the Plummer chair factory cost $20,000; the Roberts planing-mill cost $25,000; and the Kansas mattress factory cost $20,000. The total cost of these factories was not less than $375,000 (417). The Arkansas City Water Power Company leased 300 horse-power to the Arkansas Milling Company, 50 horse-power to the Arkansas City Gas and Electric Company, 25 horse-power to the Kansas Mattress Company, 25 horse-power to the Kirkwood Wind Engine Company, and 25 horse-power to the Plummer Chair Company, making 425 horse-power delivered to these different factories (420). The use of this cheap power and the building of these factories was a great and attractive advantage to Arkansas City (411). It was the biggest thing they had (421). They boomed it and talked it and it was their religion (422). In 1880 Arkansas City had 1060 population (417) and ten years later this population had increased to about 8000, and the business blocks were built of stone and brick. There were ten three-story blocks, and three four-story blocks, and the Fifth Avenue hotel, five stories in height, costing $125,000, and these were all built of stone (417). The assessed valuation by 1894 had reached $1,500,000, and the Arkansas City Water Power Company was doing a satisfactory and a paying business (417).

About the year 1890 the water in the river began to fail and the flow of the river was not more than one-half as large as formerly (389). The water power in the canal also began to fail, and the canal company could not furnish the water power to the factories. Some of the factories moved away, some of them failed, and the others were compelled to supplement their cheap water power by a more expensive steam power, and their cost of insurance was increased (421). The loss to the business interests of Arkansas City was enormous. The population decreased, and the assessed valuation has fallen to half of what it was prior to the depletion of the water (417). Below the mouth of the canal, during the dry season of the year, the Arkansas river has practically no flow, this canal taking every drop of water coming down. It used it for power purposes, turning it into the Walnut river, which then returned the water to the Arkansas river (368). No one can estimate the loss in dollars and cents to the business interests of Arkansas City and Cowley county, and the loss of revenue to the state of Kansas within this territory, by the depletion of the waters in the river, and the loss of this costly but cheap water power so utilized at Arkansas City; but that this loss is enormous and thus far has been continuous is beyond dispute. The net loss to the Arkansas City Water Power Company itself for the last fifteen years cannot be accurately computed. But the power failed, the mills moved away or relied upon a more expensive means for turning their wheels, and this injury furnishes another ground of complaint and adds to the force of the prayer for relief.

SEC. 14. The Irrigation Ditches in Western Kansas.

The injuries complained of in this case are not confined to the agricultural interests in the lower half of the Arkansas valley, in which the rainfall is generally suffi-

cient for the maturing of crops, and to the loss of water power at Arkansas City, but also extends from the state line to the region of Dodge City, in which generally the rainfall is not sufficient for the production of the ordinary crops raised in a humid region. The average rainfall at Syracuse has been about 16 inches; at Garden City, for the last twelve years, it has averaged 20 inches; at Dodge City it has been about 25 inches; and at Hutchinson and Wichita it has been about 30 inches per year. When the western portion of the Arkansas valley was settled, in the late '70's and the early '80's, it was soon found that the ordinary rainfall would not be sufficient moisture to raise such crops as would be warranted by reason of the richness of the soil, and a number of irrigation ditches were soon dug and put into active use. The number was not great nor were the ditches large, but, so far as they went, for the next ten years they furnished ample water for the maturing of the crops during the dry season of the year. These ditches, beginning at the state line between Kansas and Colorado and coming down the river, may be briefly described as follows:

The Frontier ditch is largely east of the state line in Hamilton county, 3300 feet being in Colorado and eight miles in Kansas, and has been in existence about ten years (951, 957).

The next ditch is the Collier ditch. It was dug in the year 1882; was 12 feet wide on the bottom, 2 feet deep, with sloping sides, with a $2\frac{1}{2}$-foot grade (1882).

The Alamo Irrigation and Manufacturing Company was chartered May 26, 1888, and an amendment to its charter was filed May 8, 1889 (exhibits Nos. 54 and $54\frac{1}{2}$). The Alamo ditch was 15 or 20 feet wide on the bottom, and has two head-gates, six or eight miles apart. These ditches were 2 or 3 feet deep, with sloping sides, and a grade of $2\frac{1}{2}$ feet to the mile. The Alamo

ditch acquired all the rights of the prior Collier ditch, and was an extension of the same, and would irrigate 15,000 acres of land (1881).

The Amazon Irrigating Company was chartered on the 29th day of November, 1887 (exhibit No. 49), (577). Its head-gate is on the north side of the Arkansas river, at Kendall, in Kearny county. It was 24 feet wide on the bottom, 4 feet deep, $1\frac{1}{2}$ feet slope, $3\frac{1}{2}$ feet fall per mile, was 100 miles long, cost $150,000, and would irrigate 35,000 acres of land (600, 1891).

The Great Eastern Irrigating, Water Power and Manufacturing Company was chartered on the 8th day of October, 1880 (exhibit No. 48), (577). Its head-gate is on the north side of the river, at Hartland, Kearny county, Kanas. It was 20 feet wide on the bottom, $2\frac{1}{2}$ feet deep, sides $1\frac{1}{2}$ feet slope, a grade of 3 feet per mile, was 30 miles long, cost $60,000, and would irrigate 50,000 acres of land. Work was commenced upon this ditch in July, 1881, and water was used in the year 1882 (599, 1891).

The Minnehaha Irrigating Company was chartered July 20, 1880 (exhibit No. $49\frac{1}{2}$), (577), and its rights were merged into the Western Irrigating Company, which was chartered on the 27th day of August, 1881 (exhibit No. $48\frac{1}{2}$), (577). Its head-gate is on the south side of the Arkansas river, at Hartland, Kearny county, Kansas, almost directly opposite to the head-gate of the Great Eastern. It was 20 feet wide at the bottom, $2\frac{1}{2}$ feet deep, sides $1\frac{1}{2}$ feet slope, a grade of 3 feet per mile, was 15 miles long, cost $20,000, and would irrigate 50,000 acres of land. Work on this ditch was begun in 1880, and water was used in 1881 (599).

The Kansas Irrigating, Water Power and Manufacturing Company was chartered on the 1st day of March, 1880 (exhibit No. 46), (577). Its head-gate is on the north side of the river, near Deerfield, at the west line

of Finney county, Kansas. It was 25 feet wide on the top, $2\frac{1}{2}$ feet deep, sides $1\frac{1}{2}$ feet slope, a grade of $2\frac{1}{2}$ feet to the mile, was 15 miles long, cost $20,000, and would irrigate 35,000 acres of land. Work was commenced on this ditch in 1880, and water was used in the spring of 1881 (598). This Kansas ditch is known and was often spoken of by different witnesses as the Farmers' ditch or the Illinois ditch.

The Garden City Irrigating, Water Power and Manufacturing Company was chartered on the 8th day of November, 1879 (exhibit No. 47), (577). Its head-gate is on the north side of the river, four miles west of Garden City. It was 15 feet wide on the top, 2 feet deep, sides $1\frac{1}{2}$ feet slope, with a grade of $2\frac{1}{2}$ feet per mile, was 15 miles long, cost $15,000, and would irrigate 15,000 acres of land. Work was commenced on this ditch in 1879, and water was used in it in 1880 (597).

The Eureka Irrigating Company was chartered on the 1st day of February, 1883 (exhibit No. 13), (491). Its head-gate is on the north side of the river, at Ingalls, Gray county, Kansas. It was 40 feet wide at the bottom, 3 feet deep, sides $1\frac{1}{2}$ feet slope, a grade of 4 feet to the mile, was 96 miles long, cost $300,000, and would irrigate 30,000 acres of land (482). This Eureka ditch is also known as Soule ditch.

The total capacity of all the ditches in western Kansas is perhaps between 600 and 700 cubic feet per second (1487, 1892). The total cost would aggregate $600,000, and they would irrigate 245,000 acres of land (1859). All of these ditches were constructed immediately after the companies were chartered, the work progressing uninterruptedly until they were completed, and the water was immediately turned in and used (597, 598). From the year 1880 down to about the year 1888 the land that was irrigated by these ditches was in constant cultiva-

tion, the acreage was increasing, and the production was satisfactory, and formed the basis of the marvelous growth and prosperity of Garden City during those years (610, 611, 612). It will be convenient to have the priorities of the Garden City ditches in chronological order, which is as follows:

The Garden City ditch, November 8, 1879.
The Kansas ditch, March 1, 1880.
The Minnehaha ditch, July 20, 1880.
The Great Eastern ditch, October 8, 1880.
The Western ditch, August 27, 1881.
The Collier and Alamo ditch, 1882.
The Eureka ditch, February 1, 1883.
The Amazon ditch, November 29, 1887.

From the time these ditches were constructed until about 1890, or a year or two earlier than that, there was sufficient water in the Arkansas river to supply their needs. It was continuously used and was rapidly laying the foundation for an agricultural prosperity that has not been surpassed in any portion of the arid region. The soil of the Arkansas valley, being exceedingly fertile, responded with proportionate crops; the land became very valuable and returned a large revenue to the state of Kansas.

These ditches in western Kansas during the years 1881, 1882, 1883, 1884, 1885 and 1886 had an ample supply of water for the irrigation of the lands under them. If the river, during any of these years, became low during the dry season of the year, still there was water enough to supply the needs of this community, and the region of Garden City became widely known and justly celebrated because of its increasing productiveness and brilliant prospects. This prosperity and these prospects were seized upon by numerous parties who, across the line in the state of Colorado, saw what could be done by irrigation in the Arkansas valley. Prior to

this time there had been a few small personal ditches in the Arkansas drainage area in the state of Colorado, but they were neither large nor had they taken much water from the river for their supply. By about the year 1885 the construction of a larger class of ditches was arranged and begun, and by the year 1891 such a system of ditches between Canon City and the state line had been completed, although some were enlarged and improved after that time, and by the year 1892 practically the total flow of the river, exclusive of flood periods, was diverted, appropriated and used in the state of Colorado. The effect upon the Garden City ditches, upon the valley below and upon the Arkansas City water power, was immediately noticed, and in its destructive influence became deplorable. The Garden City ditches went dry ; the land remained uncultivated ; the basis of its extensive civilization was undermined. The Highlander had not physically invaded the territory of the prosperous Lowlander, but from across the state line, at a point further up the river, he withdrew the waters and brought devastation below. From about 1893 the Garden City ditches could not furnish a sufficient supply of water to their customers. Their patrons complained, and refused to pay the price of the withheld water-supply. The ditch companies became bankrupt, the ditches fell into disuse—not abandoned, but unused except when the flow of waters would pass the headgates above. The excuse given for the appropriation of waters in an arid region which for twenty years had been supplying one of the richest of valleys below them was their constitution, their laws, and their necessities, regardless of the fact that these appropriations worked an injury to the state below and despoiled the valley of its nourishment. The millions of dollars that had been invested in the Garden City ditches were almost totally lost. Population decreased, the inhabitants moved away, and the dry ditches of the Garden City

district remained as a mournful monument to the destructive theory of state sovereignty just across a near-by state line.

SEC. 15. The Diversion of the Waters.

The irrigation system of Colorado, extending over the rivers and streams and all flowing waters of the state, is under the direct control of state officers, and is operated by their orders and according to statutory enactments and judicial decisions. These officers are divided into three classes. The first is the state engineer, who is appointed by the governor for a term of two years, is paid out of the general appropriation, and has jurisdiction throughout the state (525). The second class is composed of five division engineers, the state being divided into five divisions, according to the drainage areas (525), the Arkansas river and its tributaries forming division No. 2 (525). The division engineer is appointed by the governor, paid by the state, and has jurisdiction throughout his division, reporting to the state engineer (491). The third class is composed of the water commissioners in each district, each division being divided into as many districts as convenience or necessity may require (525, 969). The water commissioners report to the division engineers and also to the state engineer. The second division, comprising the Arkansas river and its tributaries, is composed of water districts Nos. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 66, and 67 (671). The state engineer, these division engineers and these water commissioners form one branch of the government and administration of the state of Colorado (491).

All the waters of the Arkansas river and its tributaries in the state of Colorado, down to the head-gates of the canals or ditches, are under the direct control of the state engineer, the division engineer of division No.

2, and the water commissioners of these several districts (491). The amount of water any ditch or canal is entitled to is determined by a decree of the district court of the proper county, but the amount of water which any canal or ditch receives is determined by these state officers, subject to the laws of the state (491). Until water has passed the head-gates of a canal or ditch the owners or proprietors of the canal or ditch cannot be said to have any control over it. After water passes the head-gate it may be said to belong to the corporation or individual users (492). It is clear, therefore, that the state of Colorado itself is the one that directly makes the diversion of the waters of the Arkansas river, and is responsible to a greater degree than the water users themselves for the diversions made within the last few years. During the early history of the state of Colorado, and even for a few years prior to the formation of the state, there were a few small individual irrigation ditches dug along the Arkansas river or its tributaries, and a few small, insignificant diversions of waters were made in those early years; but they were purely local, exceedingly small, owned and controlled by individuals for use upon a small fraction of a section of land, and had no perceptible effect upon reducing the flow of the river or of its tributaries. But after irrigation had been made a success in western Kansas, in the early '80's, and also in a section of the district around Greeley, Colo., at about the same time, then the diversion of water from the Arkansas river or its tributaries became an applied science, and was executed with invincible skill. The small, individual ditch of early years passed practically out of existence, or at least out of consideration, and for the last fifteen years the waters of the Arkansas river have been wholly appropriated and depleted by the large, incorporated ditch companies, many of whom are made defendants in this case. The

records introduced may show a large number of individual ditches located in former years, but the evidence also shows that, if any of these ditches remain in existence at the present time, they are so small as to be utterly insignificant in producing any effect upon the depletion of the waters.

Some years ago the legislature of Colorado authorized the construction of a state canal on the north side of the Arkansas river near Canon City (492, 674, 767). An appropriation was made and the work was to be done under the direction of the state engineer (492, 674, 767). Convict labor at the penitentiary at Canon City was used, and about four miles of this canal were actually constructed (492, 674). This canal when completed would extend from about four miles above Canon City, along the north side of the Arkansas river, down to the Fountain river, a distance of about 70 miles, would carry between 300 and 500 cubic feet per second, and would irrigate about 50,000 acres of land (493).) Trouble arose over the use of this convict labor and work on the canal was for the time suspended, but the greater portion of the territory covered by this canal, as projected, lies open for future development whenever the legislature of the state sees fit to make further appropriations. There were no lands irrigated along this portion of the canal that was already constructed, for there are no lands there that can be irrigated, but below there is a wide field for future state development (493).

The state of Colorado has at different times appropriated money and has constructed three reservoirs in which to store water for irrigation purposes. The Monument reservoir is located in El Paso county, near the Fountain river, on Monument creek (517, 675). It covers sixty or eighty acres of land, is about ten feet deep, and cost about $50,000 (675). Boss Lake reservoir is in Chaffee county, is about the same size as the

Monument reservoir, and is perhaps twenty-five feet deep. The third reservoir is near Trinidad, in Las Animas county. These three reservoirs are all in the drainage area of the Arkansas river and impound water for irrigation purposes, which is used, when needed, under the direction of the state engineer and the division engineer of district No. 2 (517).

The drainage area of the Arkansas river in the state of Colorado covers about 26,000 square miles, or about one-quarter of the total area of the state of Colorado (620). An examination of the appropriations made, decrees recorded and ditches constructed will show how, since about the year 1885, the total divertible flow of the Arkansas river has been appropriated over and over again; how the decrees have multiplied in number and been extended in amounts; and the examination of the evidence in connection with these decreed appropriations will show how the total flow of the Arkansas river in Colorado during the irrigation season has been wholly diverted, and applied, except during flood periods, for irrigation purposes in the state of Colorado, practically allowing no water whatever, during the irrigation season of the year, to escape across the state line into Kansas. A description of the more important ditches, beginning at Pueblo and coming down the river to the state line, is as follows:

The Bessemer canal has its head-gate in range 66, 12 miles west of Pueblo, on the south side of the river, is 20 feet wide, 40 miles long, with a carrying capacity of 400 cubic feet per second, and a decreed appropriation of 364 cubic feet per second, dated May 1, 1887, extending back 10 miles from the river, and is capable of irrigating 20,000 acres of land (493).

The Colorado or Bob Creek canal, has its head-gate in range 62, 18 miles east of Pueblo, on the north side of the river, is 44 feet wide, 100 miles long, with a

carrying capacity of 900 cubic feet per second, and a decreed appropriation of 756.28 cubic feet per second, dated June 9, 1890, extending 20 miles back from the river, and would irrigate 50,000 acres of land (494).

The Rocky Ford High Line canal has its head-gate in range 61, 24 miles east of Pueblo, on the south side of the river, reaches 100 feet above the river, is 75 miles long, with a carrying capacity of 600 cubic feet per second, and a decreed appropriation of 418 cubic feet per second, dated January 6, 1890, and pretends to have absorbed also the following appropriations: Enterprise, 2.5 cubic feet, of 1867; Ballow Hill, 16 cubic feet, of July 1, 1869, and 30 cubic feet, of July 1, 1885; Allen, 2 cubic feet, of March 1, 1886, and 2.5 cubic feet, of 1890—extending back 20 miles from the river, and would irrigate 25,000 acres of land (495).

The Oxford Farmers' canal has its head-gate in range 60, on the south side of the river, 41 miles east of Pueblo, is 15 feet wide, 15 miles long, with a decreed appropriation of 116 cubic feet per second, dated February 26, 1887, extending 7 miles back from the river, and would irrigate 6000 acres of land (495).

The Otero canal has its head-gate in range 59, 3 miles east of Fowler, on the south side of the river, is 10 feet wide, 60 miles long, with a carrying capacity of 457.92 cubic feet, and a decreed appropriation of 123 cubic feet, dated March 3, 1890, extending 5 miles back from the river, and would irrigate 8000 acres of land (495).

The Catlin canal has its head-gate in range 59, 4 miles east of Fowler, on the south side of the river, is 25 feet wide, 35 miles long, with a decreed appropriation of 248 cubic feet per second, dated December 3, 1884, and a further decreed appropriation of 97 cubic feet per second, of November 14, 1887, extending 5 miles back

from the river, and would irrigate 20,000 acres of land (495).

The Laguna or Lake canal, known also as the Holbrook canal, has its head-gate in range 58, 4 miles east of Manzanola, on the north side of the river, is 25 feet wide, 26 miles long, with a carrying capacity of 500 cubic feet per second, and a decreed appropriation of 155 cubic feet per second, of September 25, 1889, extending back 8 miles from the river, and would irrigate 18,000 acres of land (496).

The Rocky Ford canal has its head-gate in range 57, 5 miles east of Manzanola, on the south side of the river, is 15 feet wide, 15 miles long, with a decreed appropriation of 111.76 cubic feet per second, of May 15, 1874, and a further decreed appropriation of 96.54 cubic feet per second, of May 6, 1890, extending back 4 miles from the river, and would irrigate 8000 acres of land (496).

The Fort Lyon canal has its head-gate in range 55, three miles west of La Junta, on the north side of the river, is 66 feet wide, 113 miles long, with a carrying capacity of 2000 cubic feet per second, and a decreed appropriation of 164.64 cubic feet per second, of April 15, 1884, and a further decreed appropriation of 597.16 cubic feet per second, of March 1, 1887, extending back 15 miles from the river, and would irrigate 40,000 acres of land (496).

The Amity canal has its head-gate in range 48, seven miles west of Lamar, on the north side of the river, is 20 feet wide, originally 110 miles long, 70 miles of which are now in use, with a decreed appropriation of 283.5 cubic feet per second, of February 21, 1887, extending back 12 miles from the river, and would irrigate 15,000 acres of land (496).

The Lamar canal has its head-gate in range 46, 3 miles east of Lamar, on the south side of the river, is 15 feet wide, 30 miles long, with a decreed appropria-

tion of 15.75 cubic feet per second, of November 30, 1875, and 87.84 cubic feet per second, of December 3, 1877, and 11.70 cubic feet per second, of September 11, 1889, and of 184.27 cubic feet per second, of July 16, 1890, extending back 6 miles from the river, and would irrigate 15,000 acres of land (497).

The Graham ditch has its head-gate in range 45, 10 miles east of Lamar, on the south side of the river, is 8 feet wide, 7 miles long, with a decreed appropriation of 61 cubic feet per second, of August 24, 1891, extending back 3 miles from the river, and would irrigate 4000 acres of land (497).

The Buffalo canal has its head-gate in range 43, 18 miles east of Lamar, on the north side of the river, and 12 miles west of the Kansas state line, is 10 feet wide, 16 miles long, with a carrying capacity of 192 cubic feet per second, and a decreed appropriation of 67.5 cubic feet per second, of January 29, 1885, extending back 4 miles from the river, and would irrigate 4000 acres of land (497).

Near Las Animas are also the Jones ditch, with a decreed appropriation of 44.3 cubic feet per second, of February 18, 1890; and the Town ditch, with a decreed appropriation of 38 cubic feet per second, of March 7, 1884 (exhibit No. 53, p. 51).

Near Lamar are also the Colorado and Kansas canal, with a decreed appropriation of 27.77 cubic per second, of April 1, 1886; the Bed Rock ditch, with a decreed appropriation of 32.77 cubic feet per second, of March 10, 1889, and 26.77 cubic feet, of August 12, 1890; the Manville ditch, with a decreed appropriation of 54 cubic feet per second, of October 14, 1890; and the Hyde ditch, with a decreed appropriation of 23.44 cubic feet per second, of May 10, 1887 (exhibit No. 53, p. 52).

Of these smaller ditches along the Arkansas river between Canon City and the state line we have made no

mention, and have not enumerated the amounts of their decreed appropriations, but in comparison to the ones mentioned they are small and insignificant.

The water is diverted from the Arkansas river and made to flow into these ditches by dams constructed in different ways and of different material. The permanent dams are constructed of masonry and cement work and of piling driven into the sand. Less perfect and less expensive dams are constructed of timber and brush and other material. The least expensive dams are known as sand dams. The larger and more perfect dams extend across the river from bank to bank, and are built of sufficient height to turn the whole flow of the river at a normal stage into the adjoining canal. All of these dams are described in the evidence (530–534). The two most expensive dams on the Arkansas river in Colorado are the Fort Lyon dam, three miles above La Junta, and the Amity dam, nine miles above Lamar. Complainant's exhibit No. 42 is a photograph of the Fort Lyon dam, taken on the 24th day of August, 1904, from the south side of the river and from below the dam, looking up and across the Arkansas river. This dam is ten feet high, is from bank to bank, and so constructed as to prevent any water, even at an unusual flow of the river, from flowing over the dam (531). A copy of this photograph is found at the conclusion of this section. Complainant's exhibit No. 43 is also a photograph of the Fort Lyon dam, taken at the same time as exhibit No. 42, "showing that all of the water of the river is running through the head-gate into the ditch" (532) ; a copy of this exhibit is also found at the end of this section. Complainant's exhibit No. 44 is a photograph of the Fort Lyon head-gate, showing the canal a few rods below the head-gate, taken also on the 24th day of August, 1904. "It shows in detail the lower side of the head-gate, from which is issuing the water

shown in exhibit A-43, which flows through it from above, and on the left side of the picture are the outlines of the dam, extending from bank to bank. The Fort Lyon head-gate is about sixty-six feet wide, and on the day I was there the water was flowing through it about four feet deep. The Fort Lyon dam and the head-gate are permanent structures, costly and expensive'' (532). A copy of exhibit No. 44 is also found at the conclusion of this section.

What is here shown of the Fort Lyon dam is also true of the Amity dam, and is also true of the other dams along the river to a somewhat less extent. These dams and these ditches are so constructed that each one in its order, excepting the very smaller ones, may take the whole normal flow of the river, and also whatever seepage or return water may find its way back to the river above the head-gate. The skill of the Colorado irrigators is shown in the Arkansas valley by so locating their ditches that the lower ditch may take all of the water flowing past the head-gate of the upper ditch, but also to catch or capture the return or seepage water from the upper ditch. This becomes apparent from an examination of the map introduced in evidence by the intervenor as exhibit No. 7. The point along the Arkansas river in Colorado where the return waters from the upper ditches would find their way back into the Arkansas river in Colorado is clearly stated by Mr. Cressey, of Rocky Ford, Colo., who was the water commissioner for district No. 17. Mr. Cressey says that the seepage or return waters from each of the Colorado ditches would flow back toward the river because of the level of the ground and of the substrata sloping toward the river and that they could not return to the river below certain rivers, creeks, gulches or arroyos draining into the river below each of these ditches and above the head-gate of the ditch next below it.

Mr. Cressey testifies that the seepage water from the Bessemer ditch would all return to the river before it had passed range 62 (923). He further says that the seepage water from the Bob Creek canal would all return to the Arkansas river west of range 58 (923); that the seepage water from the Rocky Ford High Line ditch would all return to the river west of the east side of range 50 (923); that the seepage from the Oxford Farmers' ditch would all return to the river not further east than the Apishapa, on the west edge of range 58 (923); that the seepage from the Otero canal would return to the river not further east than range 53 (924); that the seepage from the Catlin canal would return to the river not further east than range 56 (924); that the seepage from the Laguna or Holbrook ditch would all return to the river not further east than the center of range 55, or Horse creek, in range 54 (924); that the seepage from the Rocky Ford ditch would all return to the river not further east than Timpas creek, on the east side of range 56 (924); that the seepage from the Fort Lyon canal would all be returned to the river not further east than Horse creek, Adobe creek, Gageby creek, Limestone creek, Graveyard creek, and not further east than the west line of range 45 (924); that the seepage from the Las Animas Town ditch and the Jones ditch would be returned to the river not further east than Purgatoire, on the east line of range 52 (924); that the seepage from the Colorado and Kansas ditch, the Bed Rock ditch and Keesee ditch would all be returned to the river not further east than the east line of range 45 (924); that the seepage water from the Amity ditch would be returned to the river not further east than Sand creek and Buffalo creek, in range 42 (924); that the seepage water from the Lamar canal would be returned to the river not

further east than the center of range 43 (924). Mr. Cressey then says:

"That is all, excepting the little ditches. The seepage water from all these canals that would return water to the river west of the Amity canal would be used by the Amity canal when it needed it, unless it would be the seepage water filling up the sand of the river that don't come to the surface at that point. But if they come to the surface below the head-gate of the Amity canal, and by that means increase the flow of the river, they would still simply reinforce the lower ditch, if there were a lower ditch that needed water. The main effect of all this seepage water is to increase the amount of water used by each ditch below the point where this seepage water returns to the river." (924.)

This testimony conclusively shows that, while the theory of return seepage in itself may be true to a certain extent, the ditches along the Arkansas river in Colorado are so located that each ditch takes up and appropriates whatever seepage may have returned from the ditches above, and the only seepage water that could possibly get into the Arkansas river so as to affect the flow of the stream through the state of Kansas, is the one ditch located farthest east; so that the flow of the river through the counties in Kansas could only be affected by the inconsiderably small seepage or return waters from the Buffalo or Frontier ditches. The testimony of Mr. Cressey harmonizes with the photographs taken, harmonizes with the narrow and obstructed bed of the river, that the flow of the river through Kansas is immeasurably less and not more uniform than during the early years.

The uncontradicted testimony of the defendant's witnesses, as well as the testimony of the very capable witnesses introduced on behalf of the intervenor, shows that when water is used for irrigation purposes under ordinary conditions, about two-thirds of the amount di-

verted is lost by evaporation and absorbed by plant life (1029, 1390). The water, where it is diverted from the Arkansas river in Colorado, is spread out on a dry, arid plain, in an altitude varying from 3370 feet to more than 5000 feet above the level of the sea, and goes to saturate a soil that is naturally dry, many miles back from the river, through a region where the rainfall is only from ten to fourteen inches a year. The evaporation is great and the absorption by this arid soil is also great, besides the amount that is taken up by the growing plants. There are 2,250,000 gallons of water lost every twenty-four hours at the steel works of the Colorado Fuel and Iron Company, at Pueblo (730).

The decreed appropriations made from the Arkansas river in Colorado are enough to take the full flow of the river many times over, making no mention of the smaller ditches between Canon City and the Kansas state line. In the year 1902, in the Arkansas basin in Colorado, there were 300,115 acres irrigated (654).

Of these ditches above enumerated, the total appropriations, by years, are as follows:

In 1867	2.5	cubic feet	per second.
In 1869	16	"	"
In 1874	111.76	"	"
In 1875	15.75	"	"
In 1877	87.84	"	"
In 1884	450.64	"	"
In 1885	97.5	"	"
In 1886	29.77	"	"
In 1887	1,481.10	"	"
In 1889	199.47	"	"
In 1890	1,705.66	"	"
In 1891	61	"	"

All of these ditches were dug, and their construction completed, and the water turned in and used, within from one to two years after the dates of their respective appropriations (505).

Complainant's exhibit No. 14 is a complete list of the names of appropriators and the amounts and dates of

decreed appropriations of ditches taking water from the Arkansas river and its tributaries in Colorado. The total amount of its appropriations from the Arkansas river and its tributaries in Colorado is 10,248.56 cubic feet per second of time (498). To show what an insignificant amount was appropriated in the early years, this evidence shows that prior to January 29, 1861, the total appropriations made from the Arkansas river and its tributaries in Colorado were 11.14 cubic feet per second (522).

The actual diversion and use of water from the Arkansas river and its tributaries in Colorado is made almost wholly by the ditches above named and enumerated, the balance appropriating and using so small an amount as to be inconsiderable. The total decreed appropriations of these ditches above named is 4258.99 cubic feet per second, and for convenience of reference these appropriations are collated as follows:

	Cu. ft.	*Date.*
Bessemer	364	May 1, 1887
Colorado, Bob Creek	756.28	June 9, 1890
Rocky Ford High Line	418	Jan. 6, 1890
Enterprise	2.5	—— —, 1867
Ballow Hill	16	July 1, 1869
Ballow Hill	30	June 1, 1885
Allen	2	Mar. 11, 1886
Allen	2.5	—— —, 1890
Oxford Farmers'	116	Feb. 26, 1887
Otero	123	Mar. 3, 1890
Catlin	248	Dec. 3, 1884
"	97	Nov. 14, 1887
Laguna	155	Sept. 25, 1889
Rocky Ford	111.76	May 15, 1874
"	96.54	May 6, 1890
Fort Lyon	164.64	April 15, 1884
"	597.16	Mar. 1, 1887
Amity	283.5	Feb. 21, 1887
Lamar	15.75	Nov. 30, 1875
"	87.84	Dec. 3, 1877
"	11.70	Sept. 11, 1889
"	184.27	July 16, 1890
Graham	61	Aug. 24, 1891
Buffalo	67.5	Jan. 29, 1885

	Cu. ft.	Date.
Jones	44.3	Feb. 18, 1890
Town	38	Mar. 7, 1884
Colorado and Kansas	27.77	April 1, 1886
Bed Rock	32.77	Mar. 10, 1889
"	26.77	Aug. 12, 1890
Manville	54	Oct. 14, 1890
Hyde	23.44	May 10, 1887

Mr. J. S. Greene, in a very comprehensive and useful article published by the United States Department of Agriculture as bulletin No. 140 for the year 1903, entitled "Acquirement of Water Rights in the Arkansas Valley in Colorado," and being exhibit No. 53, on page 29 says:

"The writer further estimates that the mean annual divertible flow of the Arkansas river, expressed for months in terms of the mean flow in cubic feet per second for each month, will be as set forth in the following table:

MEAN ANNUAL DIVERTIBLE FLOW OF ARKANSAS RIVER IN COLORADO.

(Not flow at any particular point.)

	Cu. ft. per sec.		Cu. ft. per sec.
January	660	July	2,250
February	700	August	1,100
March	800	September	700
April	1,030	October	690
May	2,630	November	720
June	4,370	December	720

"The above table shows the mean divertible flow in cubic feet per second for each month. There are periods during the spring months when, for a few hours or days, the flow at certain points may be very great, as in 1894, when it was 30,000 cubic feet per second at Nepesta.

"Assuming the divertible flow of the Arkansas river to be as set forth in the above table, it is possible to determine approximately the times, in years of average flow, during which any canal may receive water from the Arkansas river under its decree; assuming also that the several ditches or canals fed from this stream receive water in accordance with the decrees. An examination

of the decrees for comparison with the divertible flow will disclose, in round numbers, the following results:

APPROPRIATIONS FROM THE ARKANSAS RIVER IN DISTRICTS 11, 12, 14, 17, AND 67.

(Approximate.)	*Cu. ft. per sec.*
Prior to January 1, 1870	400
Prior to January 1, 1880	600
Prior to January 1, 1890	3,200
Prior to January 1, 1900	5,200

"Thus an appropriation of ten cubic feet flowing constantly, with a priority date of January 1, 1870, would receive water at all times during years of average flow. Such an appropriation with a priority date of January 1, 1880, would also receive water at all times during years of average flow, but during years of minimum flow would be deprived of water part of the time. Such an appropriation with a date of January 1, 1890, would receive water in average years during June and parts of May and July, and during flood times in other months. Such an appropriation with a date of January 1, 1900, would receive no water in average years, except during a portion of June and flood periods. When ditches with early rights do not demand water, ditches with later rights receive water for longer periods."

The evidence shows that when earlier ditches did not demand it later ditches were given water to their full carrying capacity, regardless of their decreed appropriations, when there was that much water in the river to be delivered. Mr. McDowell, water commissioner of district No. 67, testified that for eight or ten days in the month of May, 1904, the Amity ditch was given 600 cubic feet per second of time, although its decreed appropriation was only 283.5 cubic feet (969). He also says: "That is our custom here, and has been for the last twelve or thirteen years." (969.) He further says, on the same page, that another ditch in district No. 67 was carrying more than its decreed appropriation, and that the Fort Lyon ditch, not in his district, was also carrying more than its decreed appropriation.

Mr. Wiley, superintendent of the Amity canal, testified that the Amity system was composed of a portion of the Fort Lyon canal, the whole of the Amity canal, and the whole of the Buffalo canal, and that each of these takes water directly out of the Arkansas river (1446). He further testified that the carrying capacity was something over 2000 cubic feet per second of time through at least forty miles in length, and that the carrying capacity of the Amity canal was 800 cubic feet per second, and of the Buffalo 200 cubic feet per second (1446).

He further testifies that

"during the winter our carrying capacity is greater than the amount of water that we really get. Yes, sir, we find it profitable to take, during that season, all that the river will give us, and even then we have not been able to fill our reservoirs. Yes, sir, during these floods when we take the water that we find in the river we use the full carrying capacity of all three of the ditches. In the year 1900 the river kept up to such a height that we used the capacity of our inlet canals to the reservoirs until some time in July—practically constantly from February until July. It got so wet we did n't use it in two of them. It was a very wet spring. Ordinarily speaking, the regular flow of the river gives us a full ditch for not more than a week or two." (1449.)

Mr. Wiley again says:

"Yes, sir, we have the gravest trouble during the summer season in getting a sufficient supply of water for our needs. It begins with the necessary spring irrigation, in March, April, and May. It is relieved during the flood season, which lasts for about a week or ten days in the early part of June. It begins again about the 15th of June and lasts straight through the season. Yes, during a good share of the irrigating season we get as much as we really need; I get it, but I have to fight for it." (1450.)

Again, Mr. Wiley says:

"I regret to say that after this has occurred, and the lands under these ditches with early priorities have become useless, there has been a tendency to take that water and sell it to cover a new body of land or a new use, to our detriment and loss. I do not say I think this has grown into more than a tendency, sir, I know it. The loss which the river has sustained by carrying out a new and greater use of the water has been enormous, and has been sufficient to affect very seriously the amount of water that subsequent appropriators had a legal right to." (1451.)

Again, Mr. Wiley says:

"During the time that I have spoken of, when we had the water up to the carrying capacity of our ditches, we paid no attention then to the amount of the appropriation." (1452.)

Mr. Wiley further says:

"The amount of water given us in our decree limits us to that which can be taken into our head-gate ahead of any canal which has an appropriation of a later date. In other words, it is exactly correct to say that if there was a canal with a subsequent appropriation that was taking water, the Amity would not be allowed to take more than 283.5 cubic feet at that particular time, but if they were not demanding it we could take any amount that our carrying capacity would permit." (1452.)

Mr. Chew, the division engineer of division No. 2, testified concerning the use of water by the different ditches along the Arkansas river in Colorado, and the depletion of the river to supply them, as follows:

"My official duties are to regulate the flow of water into each canal according to the amount in the river and their decreed priorities. If there is water enough in the river to supply each decreed priority, it gets the full amount if it wants it. If it is not enough to supply each of the decreed priorities, then I give it to them according to their decrees; that is, according to the age

of the ditch. If there is not enough in the river to supply more than one of these ditches that I have referred to, then I give it to that one. If there was not enough in the river to give it its full decreed priorities, then it would get what was in the river. It would take it all. If these ditches that have been specially referred to should want the water of their decreed appropriations, and there should not be that amount in the river, then they would take the whole flow of the river, if they were entitled to it. There might be older ditches on the river than these referred to that would take amounts that would decrease that very much, but the result of our distribution would be to take the whole flow of the river. We can't do it because there is a large amount of seepage that comes in below here, that runs into Kansas, that we can't get hold of. We would get hold of it if we could (499).

"During the dry season of the year there would n't be any water down there at all. If there was any water flowing in the river there would n't any of that water pass over, through or around the Amity dam if the Amity could take it. The head-gate of the Amity canal is located very close to the dam, and just below it. The ditch connects with the water that is dammed up by the construction of the dam. When the whole amount of the flow of the river at low water at that place is not more than the Amity canal can carry, then there is none of it will go by unless we order it for ditches below ; but if there is only what the Amity canal priority calls for it will never get by. The dam is so constructed that the amount of water flowing down to the dam could all flow into the ditch if there was n't any more than the ditch could carry. . . . At the ordinary season, when there is not any particularly high water, this Fort Lyon canal would take all of the flow at that place about one-fourth of the year, provided it was entitled to it. When there is simply an ordinary flow of water in the river the Amity canal can take the whole flow of the river that would reach her point for probably a quarter of the year, provided she was entitled to it. That portion of the year would probably be the winter months. Sometimes in the summer you would have to mix it up a little. The

dry portion of the year is sometimes in the spring and sometimes in the fall and sometimes in the winter, and there is no average. It occurs very frequently that when there is no excess water the Fort Lyon and the Amity ditches could take the whole flow of the river through the months of August, September, and October, provided they were entitled to it. After other priorities are satisfied these two canals could take all the flow of the river under the conditions stated during the months of August, September, and October (500, 501).

"During the months of August, September, October, November and December there is not enough water in the river to give each of these parties the full amount decreed, if the ditches that have older decrees demand their water. There would not be a sufficient amount to supply their decree. These ditches referred to use up to the amount of the decreed appropriation when it is in the river, if they need it. During the last few years these ditches referred to have not been getting as much water as they wanted. There is great difficulty in distributing the water, because the water is not in the river to give them, and when there is no water in the river everybody wants what is there, and we can't let them have it. Then I close the gates down and stop them from taking it and give it to those it is decreed to or to the owners of the priorities. During the last eight years there have been some portions of the year that they were not getting the full amount of their decreed appropriations and the amounts they desired. This has frequently occurred at some time during the year. One year it went for a whole season pretty nearly. It went for three or four months at a time and sometimes for thirty or sixty or ninety days. The year I spoke of was the year 1901, or perhaps 1902. It was particularly a dry year. As to the proportion of water that each of the ditches got, if there was water at all they would get their *pro rata;* if there was n't water they would n't get any. There was some time during the season they would get from one-half to one-fourth or three-tenths of the amount they wanted. During the season they got variable amounts, and sometimes they didn't get any (503).

"I don't think that they always got as much as they wanted. I don't think they got enough to make as good a crop as it would have been if they had had more water. In order to give them all I could I took all the water from the river that I could possibly get, and I did n't allow a bit of it to get away if I could help it. We had special orders not to allow any to go down the channel into Kansas. These special orders originated with me. In speaking of the water being captured again after returning to the river as seepage, I meant to say if the appropriation nearest to the water was entitled to it it would get it. The water that would gather in the river below the dam, I don't think some of it would ever get to any dam whatever below; it would be taken into a small ditch. It would go down until it struck some other ditch and it would then be captured by that ditch, if it was entitled to it. If a dam should take all the visible water above it and put it into a ditch, some of it would get back again and some or it would go under the dam, but the next dam or ditch would catch it, if it appeared, if there was any of it in sight. Then, if any happened to go by again from that ditch or dam and went down the river a ways, another dam or ditch would capture it again, if it appeared, if there was any of it in sight; and that would be kept up from one end of the river to the other, until the Kansas line was reached, and then Kansas would get it. There is some left and Kansas gets it." (516, 517.)

No criticism is to be made upon the division engineer of Colorado for this testimony, and no special advantage is sought to be taken of it by the complainant in this case. The division engineer was here simply stating the fact, which fact has amounted to a custom, and which custom has extended through the years since this irrigation system was completed.

This system of diverting all the water that a ditch needs in Colorado from the Arkansas river, or, when no ditch with a prior appropriation was demanding it, of taking the water to the full capacity of these numerous

Exhibit No. 43 is a picture of the Fort Lyon dam, taken at the same time as exhibit No. 42, showing that all of the water of the river is running through the head-gates into the ditch.

Exhibit No. 44 is a picture of the head-gates of the Fort Lyon canal, taken at the same time as exhibits Nos. 42 and 43, showing the head-gates sixty-six feet wide, and the water flowing through about four feet deep, the outline of the dam being at the left side of the picture.

capacity of the Amity system alone is 192,000 acre-feet (977).

The average flow of the Arkansas river at Canon City for the last fifteen years has been 750 cubic feet per second (644), but at the Kansas state line during this time the average flow has been practically nothing. The water in the Arkansas river between Canon City and the Colorado line has been directly appropriated seven times over for irrigation purposes, and during the growing season of the year the total flow of the river has been, except in extreme floods, actually taken and used for these irrigation purposes; and during those periods when the ditches with prior appropriations are not demanding the water which they are entitled to under their decree, then the ditches with later appropriations have been given water to their entire carrying capacity, regardless of the decreed appropriations. By this means the state of Colorado and its irrigation corporations, being very largely the defendants in this case, have been enabled to divert and absorb the whole flow of the Arkansas river in that state, except during the period of extreme floods, and even then their demands were not satisfied and many of their reservoirs have not been filled. With this depletion of the river during the last fifteen years, it is not strange that a vigorous protest has been made on behalf of the prior interests in Kansas, and makes it easy to account for the filing of the bill of complaint in this case.

Cuts of the photographs referred to are found at the close of this section, and may be described as follows:

Exhibit No. 42 is a photograph of the Fort Lyon dam, three miles above La Junta, Colo., showing the dam ten feet high, from bank to bank, permitting no water of the ordinary flow of the river to run over the dam when the head-gates of the canal are open. This picture was taken on the 24th day of August, 1904.

Exhibit No. 43 is a picture of the Fort Lyon dam, taken at the same time as exhibit No. 42, showing that all of the water of the river is running through the head-gates into the ditch.

Exhibit No. 44 is a picture of the head-gates of the Fort Lyon canal, taken at the same time as exhibits Nos. 42 and 43, showing the head-gates sixty-six feet wide, and the water flowing through about four feet deep, the outline of the dam being at the left side of the picture.

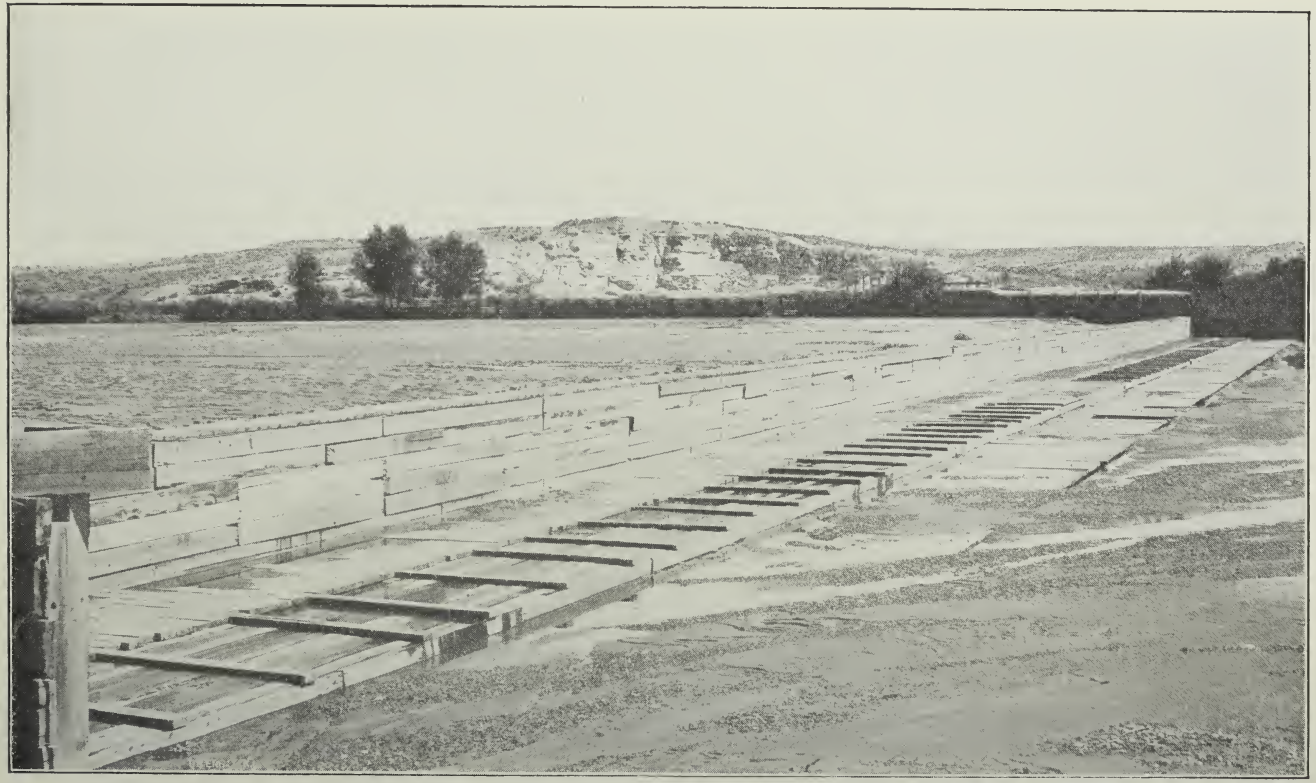

Exhibit No. 42. August 24, 1904. Fort Lyon dam, La Junta. Ten feet high, from bank to bank.

Exhibit No. 43. August 24, 1904. Above Fort Lyon dam. Water four feet deep. Whole river.

Exhibit No. 44. August 24, 1904. Fort Lyon head-gate; sixty-six feet wide, four feet deep. Whole river.

SEC. 16. The Damage to the Arkansas Valley.

It has been much easier for Colorado to compile the statistics of their accumulations along the Arkansas river than it has been for Kansas to accurately compute the losses within its territory, and it has been more agreeable for the inhabitants of Colorado to show the growth of their prosperity than it has been for the citizens of Kansas to enumerate what has been taken away. The state of Kansas has not attempted to dispute the fact that within the last fifteen years the property interests along the Arkansas river in Colorado have been enormously increased, and we would have no inclination to complain of this if it were not for the fact that the measure of increase in Colorado is even less than the measure of decrease across the line and lower down the valley in the state of Kansas. The state of Kansas would rejoice in the prosperity, improvement and development of the state of Colorado if it were not for the patent, known and notorious fact that the increase of the one has been the cause of the decrease of the other during the last fifteen years. The introduction of the records of facts in the evidence concerning the agricultural production in Prowers, Bent, Otero, Pueblo and Fremont counties, in Colorado, might have been made with commendable pride if it had not been known to every citizen along the river in the state of Colorado that the enormous diversions of water from the Arkansas river made in that state since 1885 had lessened the productiveness, the wealth and the prosperity of the valley below throughout its whole 350 miles in length, and its 2500 square miles of bottom land. The figures set out in section 15 of this brief show that prior to 1884 but a few cubic feet of water per second had been appropriated for irrigation purposes in the state of Colorado from the Arkansas river. By the year 1884,

the Arkansas valley, throughout its whole length and width in Kansas, had become prosperous and productive from an agricultural standpoint. During the year 1884 nearly twice as many cubic feet of water were appropriated from the Arkansas river for irrigation purposes in the state of Colorado than had been appropriated by all of the active and consuming ditches for all the years prior to that time. In the year 1885 nearly 100 cubic feet more were appropriated, and in the year 1887 there were 1481.10 cubic feet per second appropriated by newly organized ditch corporations. The amount appropriated in this year alone was fully twice the average flow of the river between Canon City and the state line. In the year 1889 there were 199.47 cubic feet more appropriated; and in the year 1890 the depletion of the river reached its maximum, the new ditches appropriating all they could get and some of the old ones increasing the amounts of their former decreed appropriations, making the total appropriations in the year 1890 amount to 1705.66 cubic feet per second. In the year 1891 there were 61 cubic feet added to the former amounts already appropriated, but since 1891 no further appropriations appear of record, for the plain and simple reason that there was no more water in the river to be appropriated. During the two years 1887 and 1890 alone, the total decreed appropriations were more than five times the average flow of the river from Canon City to the state line. The evidence shows that the ditches were completed and the water actually turned in and used in from one to two years after the date of the decreed appropriations, so that, by the year 1893, these newly constructed canals and ditches, begun subsequent to 1884, were in actual operation, and caused the entire depletion of the river throughout its course in the state of Kansas (505). All of the witnesses assert and admit

that by the year 1893 the waters of the Arkansas river had been appropriated and used, and by that time the full destructive effect had begun to be felt.

Throughout the counties of Sumner, Sedgwick, Reno, and Rice, the raising of corn, oats and barley was confined almost exclusively to the Arkansas valley, and generally to the bottom lands where the underflow was nearest the surface, and which lands were the most productive for these crops. From about 1881 to about 1893 the loss to these crops, according to the testimony of the most intelligent and observing witnesses, and whose experience in the valley had been over the greatest number of years, had fallen off fully one-third, as compared with the crops under similar conditions, on equally good lands, and with equally good cultivation. A proportionate loss was noticed in the raising of all kinds of vegetables, and was finally noticed in the raising of fruit. The loss to the alfalfa crop followed the loss of corn, oats, and vegetables, and was equally severe and of about the same proportion.

Mr. Harrison, of Colwich, says:

"We are not so certain of a crop as we were, more especially as to corn and potatoes and to crops of that kind. . . . This sub-irrigation has been reduced and the level of it has gone down from two to five feet, and the fact of its having gone down has affected the productiveness of our soil." (273, 274.)

Mr. Jurgensen, of Mount Hope, says:

"The loss of water has not affected the wheat crop very much, but it has affected the corn crop in dry years. The wheat crop don't depend on the underflow, but the corn crop does in a dry season. It affects every crop that depends on the underflow. The underflow, of course, has gone down, and has gone down proportionately with the river itself. Our bottom lands have become less productive because of the decreased amount of the underflow in a dry year. In a wet year it dosn't

affect it at all, but in a dry year it does, because the first years we raised corn it made no difference whether we got rain or not, we raised corn ; but since the underflow went down we don't raise any corn in the dry years." (280.)

Mr. Huss, of Mount Hope, says :

"During the first ten years we got corn on the bottom lands without any trouble ; lots of it ; it did n't appear to depend on the rainfall at all. It got its moisture from below. That is what we always claimed. During the last ten years we have n't as good corn crops on the bottom lands as we used to have. We don't have as good corn as if we had plenty of rain, but we get some corn when they won't get it outside of the bottom. We get half a crop, and maybe more. It affects potatoes and vegetables on the bottom lands in the same way as it affects corn. During the early years we could raise crops on the bottom lands from the supply water under the ground ; now we have to depend more on the rain. . . . The crop of corn, potatoes and vegetables don't equal what it used to be, nor begin to, and it is n't as certain as it used to be." (283)

Mr. Tupper, of Mount Hope, says :

"The underflow is not as near the surface as it was thirty years ago, and to the best of my knowledge it has gone down proportionately with the level of the flow of the river. This has affected the crops on the bottom lands quite considerably — corn mostly ; other crops not as much as the corn crop. It has not affected other crops to any great extent, because the corn crop is all there is raised on the bottoms. That is the principal crop. . . . The corn crop was more certain then than now, because we had more water." 284.)

Mr. Hansen, of Bentley, says :

"In that part of the county on the first bottoms we raised corn. It was just sure for a corn crop whenever we put it in. We could raise corn whether it rained or not. . . . It is a fact that when there was a failure on the upland we raised corn on the first bottoms, ex-

cept in 1874, and we put it to the underflow, that our land would hold the water. Within the last twelve or fifteen years, if we get plenty of rain, we can raise crops yet on the first bottoms, and if we don't we sometimes come mighty near failing. . . . Within the last ten or twelve years we have lost all that. It is dry." (288.)

Mr. Breese, of Colwich, says:

"The surface of this underflow has gone down, in my judgment, at least four or five feet. The fall of the underflow seemed to be gradual from along about 1888 to 1890, but after about 1890 or 1891 it always furnishes plenty of water for stock, but has been dry from that time on, with the exception of the flood period. . . . The fall of the underflow corresponded with the diminution of the flow of the water in the bed of the stream, and took place at the same period of time. The effect of this fall in the underflow upon growing crops in the Arkansas valley on my farms has been a depreciation in the crops of at least one-third." (294.)

Mr. G. M. Shive, of Burrton, says:

"The lowering of the underflow on the first bottom lands has had the effect to cut the corn off badly from want of moisture. During the first years after I went there it got its moisture from sub-irrigation mostly." (300.)

Mr. Rutledge, of Wichita, says:

"During the last ten or fifteen years the level of the underflow has gone down from three to four feet. The falling of the underflow has diminished the productiveness of the soil. We don't get as heavy corn crops as we used to. Our corn crops are not so certain. They are not so certain for the lack of underflow, as I consider it. During the first fifteen years our corn crops were practically certain, but during the last ten years they have n't been. During the first ten years I felt positive that we could raise corn from the moisture of the underflow, and we did. During the last few years we have had to depend on the rainfall, and whether the rain falls opportunely or not. I should say that the

fall of the underflow has affected the general productiveness of my land from one-third to one-half. This applies to all crops that depend upon the underflow for their moisture." (302.)

Mr. J. W. Shive, of Burrton, says:

"The lowering of the underflow has affected the crops in this valley. We used to have more of what we term sub-irrigation. Our underflow was near the surface. Then we were certain to raise corn, or almost certain, but since the water has receded we are then affected by drought and the soil does not gain its moisture from below, as it used to. This has affected the crops injuriously and to the extent of one-third, I should say, of corn and such vegetation." (311.)

Mr. Lawrence, of Wichita, says:

"The crops we raised for the next few years after 1870 were mostly corn. We did not raise much wheat until after the railroad came in here. We could always get a corn crop. The rain of course would help the corn, but the corn would do fairly well without very much rain because of the moisture in the ground and the proximity of water to the surface of the soil. On my homestead the distance to water would depend upon the condition of the river. . . . The lessening of the underflow has injured the crops very much. It caused the crops to dry up, when formerly there was plenty of moisture. The valley is as productive now as it was formerly when we get plenty of water. We don't get as much water now as we did then, but if we get plenty of rain we get good crops." (323.)

Mr. Campbell, of Wichita, says:

"It grew upon us that we were losing our river, I think about 1890. During the last ten years there has been no average flow of the river above the confluence of the two rivers to my knowledge. We often have long stretches when it is entirely dry, so that you could walk with slippers across it and not wet your feet. Just west of my house where I live now, last summer and the summer before last it was entirely dry; there was

not a drop of water there. That is about half or three-quarters of a mile above the junction of the two rivers. There is no practical flow of water any longer in the dry time. The river did n't dry up suddenly by any means, but it finally disappeared, and we have no river. I think the productiveness of the soil of the first and second bottom lands has been very much impaired. The lessening of production is by want of humidity. Before that time we have believed that we had sub-irrigation. We raised big crops. It was a conviction gathered by years of experience. We got bigger crops than they did where they did n't have what we believed to be an underflow or sub-irrigation from that river. This belief was based entirely upon observation and experience, not hearsay—observation of the decrease in productiveness of the land. This decrease, I should say, amounted to 33 per cent., say one-third, of the yield of corn." (336.)

Mr. Caldwell, of Hutchinson, says:

"The general belief has been, and it is my belief, that the lowering of the underflow has affected the production of corn lands particularly. This belief is founded on the experience of several years, and the cause is the dropping of the underflow. . . . I consider that the falling of the underflow has affected the certainty or sureness of a corn crop in this valley." (357.)

Mr. Woodin, of Arkansas City, the secretary of the Arkansas City Water Power Company, says:

"The falling-off of the water in the river affected quite materially the receipts from the sale of power from the canal. It was a material difference." (392.)

Mr Patton, of Arkansas City, says:

"When the river went down the pastures dried up." (365.)

Mr. Keller, of Arkansas City, says:

"From the time I bought my land down to 1890 my principal crop was corn and potatoes and such things. As to productiveness, my bottom land growed well, and gave satisfactory crops. On the bottom land I did n't

depend entirely upon the rainfall to make a corn crop; it seemed to make a corn crop without much rain. Being close to the water, it kept the crops alive and matured them, and back on the upland they were burned up. I should judge that there was fifty per cent. difference between the productiveness in corn on the first and second bottom lands, taking one year with another. The bottom lands were selling about double what the uplands were selling for. My experience was that the bottom land produced the best crops. I had had experience in Sedgwick county, and I owned both high and low lands, and I found there was a big difference between bottom lands and uplands in production. The fact is that I quit raising corn about six years ago because it did n't mature; it burned up. I raised nothing but wheat; it matures before the drought commences. I had to make this change because it did n't pay to raise anything else. I could n't raise corn successfully. This change in productiveness on the bottom lands as to corn became noticeable between 1889 and 1891, somewhere along there. . . . I had three springs on my farm—strong, running springs—when I went there, and they kept going. From about 1889 or 1890 they commenced lowering. Two of them fed a natural fish-pond that covered about an acre and three-quarters, that we rode around in with boats, and we stocked it with fish of different kinds, and it supplied us with fish the year round, and all the neighborhood. Well, it kept sinking away. One of the springs went dry entirely. It didn't show any coming out of the surface, and the two springs that fed this pond kept going down and down until they went dry. The fish all died in the pond. There must have been eight or ten wagon-loads of fish in there when it went dry that year. I think that was in 1890." (376.)

Mr. Edwards, of Kinsley, says:

"During the early years, I think the crops grown and planted upon the bottom lands derived their supply of moisture more from the river than any other source. We had comparatively little rain then. I always had good alfalfa crops after I began putting them out. I have always felt that this alfalfa was supplied

with moisture from the river. There are no marshy lands in Edwards county. I have probably had an average of 1000 acres in alfalfa for the last fifteen years (426). . . . My alfalfa crops during the last few years have been slowly growing less and less every year, and the cause of that has been the lack of moisture in the soil—the absence of water in the river. This decreased productiveness of alfalfa exists on other lands than those that I own, and extends the entire length and width of the valley, I think (427). I think the conditions I have described as to my own alfalfa lands are true of others through this county. I don't believe I am averaging more than a ton of alfalfa to the acre during the year. I make two or three cuttings a year. That is about one-half of a similar crop that I raised years ago. I think I have about 600 or 700 acres in alfalfa now. I think this falling-off has affected the balance of the crops as well as mine. Our alfalfa, or practically all of it, is on the bottom lands (433). This same condition as to alfalfa extends also to hay lands, I think. I have as much hay land as I have of alfalfa —about 600 acres. I think there is a larger per cent. of our river-bottom lands now in hay than in alfalfa. The average crop of hay on these bottom lands now is about half a ton to the acre. This is worth on an average about $3 per ton. I think the falling-off in vegetables that are grown on the bottom lands is about the same." (434.)

Mr. Wellman, of Kinsley, says:

"I am familiar with the crops grown on the bottom lands. We used to get about a ton of prairie hay to the acre in those early days. Now it will run 800 to 1000 pounds, generally speaking, on the bottom. I have had considerable experience with alfalfa, and it is not nearly as thrifty as it used to be. The productiveness of alfalfa on the bottoms now I would n't want to put over one-half as good as it was thirteen or fourteen years ago." (436.)

Mr. Baxter, of Kinsley, says:

"These returns show the total acreage of alfalfa in Edwards county for the year 1896 to be 4976 acres [and in 1898 to be 6923 acres]. The latest record is for 1904, and this record shows the acreage of alfalfa in 1904 in Edwards county to be 1777 acres." (440.)

Mr. Vernon, of Larned, says:

"Alfalfa is principally grown in Pawnee county on the river bottom—I think, in fact, altogether in the river and creek bottoms. Wheat is principally grown on the uplands. The principal crops upon the bottoms would be feed crops and corn. Feed would include alfalfa. (441.) During the first ten or fifteen years after I came here, where the bottom lands and the uplands were equally distant from the city in location, I would say that the bottom land was probably worth in the neighborhood of three times the value of the upland. During the last five or ten years I should say there was no practical difference, if the lands were located equally distant from the market. I attribute this comparative change in the relative values now to the fact that the continued productiveness of the bottom lands had been disappointing, and the productiveness of the uplands had been greater than was anticipated, and to the fact that the uplands are much better for wheat." (443.)

Mr. Wright, of Dodge City, says:

"As to the effect the underflow had on the production of crops on the bottom lands, it certainly was a subirrigation to crops. These bottom lands during the early years were mainly natural meadows, and the crop we raised was hay. There is hay raised on these bottoms now, but I don't think one-half as much as formerly. This is, I think, from the lack of water or moisture from underneath. There is alfalfa raised on these bottoms now. They began raising it about twenty years ago. I think the alfalfa grew more luxuriantly then than it does now, perhaps nearly one-half more, because it had more moisture than it has now. There is not a great deal of alfalfa raised on the uplands. There is not much of the uplands that is suitable for alfalfa.

Alfalfa raising is confined almost entirely to the bottom lands. The diminution in the flow of the river and the lowering of the underflow became noticeable, I should think, about fifteen years ago. It was not sudden but gradual. The lowering of the underflow has had the same effect, I should judge, upon other crops raised in the valley. The other crops are principally oats and barley." (445.)

Mr. Laird, of Dodge City, says:

"The average crop of alfalfa for the season is from a ton to a ton and a half per acre. I make three cuttings. For the first two or three years after I went there the average yield was from three to four tons to the acre. The yield of my alfalfa has fallen off fully one-half since I have been there. I raise alfalfa for seed when I can. I attribute the falling-off in the productiveness of my alfalfa to the lowering of the water in the river. It is the only cause I can give for it. The water has materially lowered in the river since I have lived on the banks. . . . There is six or eight feet difference between my first bottom and second bottom lands. When I first went there my best alfalfa land was closest to the bluffs. On the highest ground that I have was the best alfalfa; now my best alfalfa land is on the lower bottom. The lowering of the water in the river has brought this change about." (484.)

Mr. Stillwagon, of Garden City, says:

"From August, 1903, to May, 1904, the river was dry, with no flowing water in it at all. The water has decreased upon my bottom lands, I presume, about two feet. The water don't rise up like it used to. In low spots the water used to stand on the ground where there was a little slough, you know. There has been no water standing in those sloughs for about eight or nine or ten years. The water-level has been about two feet lower during the last year, and it has been that way for a number of years. I used to mow my bottoms every year until the last eight or ten years, when I don't mow it because I don't have water enough to make it grow." (550.)

Mr. Reeve, of Garden City, says:

"The river was dry from July or August, 1903, until May, 1904. It was absolutely dry, void of water so far as flowing is concerned (554). As to the effect the decrease of amount of water in the river has had upon the underflow, it has lowered the underflow from two to three feet. . . . The effect of this lowering of the underflow upon the crops along the valley of the river has been to ruin the crops in the valley. Now there is some land here that used to be very productive in alfalfa that will not grow it any more without irrigation. . . . I could only give an estimate as to the extent of the alfalfa crop in the valley being injured by the lowering of the water. It is very heavy, though. I think the lowering of the water in the valley has injured the hay crop one-half. I first noticed the decrease in the flow of the river and the lowering of the underflow ever since they commenced building the large ditches in Colorado. The water has been getting scarcer in the Arkansas river. I presume that this is the cause of the lowering of the water in the Arkansas valley in the underflow." (555.)

Mr. Worden, of Syracuse, says:

"This underflow extends clear back to the hills. I have been raising alfalfa since 1889. I seeded my crop in the spring of 1889 and commenced cutting on the 4th of July. As to the effect of the decreased flow of the river and the falling-off of the underflow upon my alfalfa crops, my alfalfa crop is practically gone. I don't know that it is altogether the decrease in water, but I lay a good deal of it to that. This is also true of other alfalfa throughout the county. We have n't had until this year nearly as good hay as we used to have years ago. I attribute this falling-off in the alfalfa and the hay crops to the fact that we have n't got so much water." (561.)

Mr. Diesem, of Garden City, says:

"The lowering of the underflow has had the effect that there are not as good crops produced in this valley land as there was in the earlier days. This condition of

affairs extends up and down the valley through the county so far as I know (576). The loss of water for irrigation purposes upon the agricultural interests of the county has been very large. It has had a material effect. I expect it has decreased the acreage of cultivated lands in the county at least one-third. The lands under these irrigating ditches have not been as productive during the last few years as they would have been if there had been as much water in the ditches as there was the first five years that I knew them. I think the value of land is not as great as it would have been if there had been as much water, the value of the land being determined by its productiveness." (577.)

Mr. Longstreth, of Lakin, says:

"Generally speaking, on the average, the productiveness of my land has become affected by the decrease in the flow of the river. The loss of water, not having it regularly, has affected the productiveness of my land, I should say, in a general way, fifty per cent. There is no question about that." (584.)

Captain Thomas, the commandant of the Kansas State Soldiers' Home, of Fort Dodge, says:

"As to what influence the flow of the river has upon these bottom lands, I will say the flow of the river affects these bottom lands owned by the state of Kansas to a certain extent. As to what effect it has, I will answer, now, not this spring but in other years, we have a little more than six acres of meadow land right adjoining the river on the north side. The hay crop is not as good there as it used to be because it does n't have the moisture, because the water is not in the river as plentifully as it used to be. As to whether the average flow of the river, exclusive of floods, for the last five or ten years is less than it used to be, I will say that since my knowledge of it, along about in the beginning of 1895, it is less, except in seasons where there are other causes that bring up freshets, but in the regular season it is not so great. As to whether the lowering of water in the river affected those state lands beneficially or injuriously, I will answer that by stating that we put wells down for water purposes there

in the home in 1894 and 1895, and about a year or such a matter after that we drilled deeper to catch up with the flow of water. The level of the water beneath had gone down, and we were compelled to dig these wells deeper for that reason, yes, sir. As to what change has taken place along the state lands owned by the state of Kansas in respect to the banks of the river and the channel, I will answer, the only change I see is this—there has a network of islands been formed along that channel along the home lands to such an extent that when a freshet comes the main channel of the river has been disturbed by reason of these islands growing up in there. It is a regular network of islands. It has thrown that current very heavily against the home lands. There were some of those islands there in 1895, when I went there, but there are a number of others that have sprung up since that time. As to what caused the growing of those islands, I will answer, it has been the absence of water—no flow. It has been so that we could walk across there in some seasons for the entire season without getting our feet wet. . . . Yes, sir, the ice pond was used during the winter to get ice, and when there was water in the river we did get ice off of it. Yes, sir, and when there was no water in the river we could n't get ice in that pond. Outside of the rainfall, as to whether the high water in the river would be beneficial to the bottom lands belonging to the state of Kansas, I will answer, outside of rainfall, if there is a head of water in the river, this underflow is much nearer the surface than when there is no water in the river, and when it is much nearer the surface, the land is more productive, yes, sir. . . . As to how far back from the river the high water in the river affects the level of the underflow, I will answer, as far back as that bottom extends. I might say to almost the base of the hill; and that is a quarter of a mile, perhaps more. Yes, sir, more in some places.'' (1940, 1941, 1948).

The enormous loss to the lands that had been irrigated between the state line and Dodge City was noticed

by Mr. Johnson, a witness for the intervenor, in his article on "The High Plains and their Utilization." In speaking of the depletion of the Arkansas river in Colorado and its effect upon the flow of the river in Kansas, on page 694, Mr. Johnson says:

"It failed in turn, however, because of increasing demands on the river in the arid belt to the westward, in Colorado, resulting finally in the drawing off of its total run during the growing season. It soon came to be facetiously remarked of this elaborate and well-devised irrigation system that it constituted the finest display of dry ditches in the arid lands.

"The out-of-season flow of the Arkansas at Garden City still goes by, but large undertakings already on foot looking to the storage in the mountains foreshadow the eventual complete disappearance of the river in western Kansas, except as it may from time to time be briefly rejuvenated by floods too large to be manageable."

The general average or aggregate loss to the Arkansas valley within the last fifteen years is impossible of accurate estimation, but it extends to every tract of land in the valley, to the lands owned by the state of Kansas (1942), and to the incalculable loss of the state itself in its revenues collected by taxation, because of the lower assessed valuation of these valley lands. This loss to the state and to the owners of the property and this decrease in the assessed valuation is very vividly but somewhat sorrowfully shown by the records of the county clerk of Finney county, where he offered in evidence the assessment rolls of fifteen quarters of lands, taken at random, so as to be fairly typical, and justly representative of the conditions in and about Garden City. These records show the assessed valuation of these different quarter-sections of land for the years 1889, 1897, and 1903, as listed for taxation, and also

show the amount of taxes assessed against each quarter. These records are as follows (1862):

Description.	Year 1889.		Year 1897.		Year 1903.	
	Valuation.	Tax.	Valuation.	Tax.	Valuation.	Tax.
NW¼ 23 22 34	$450 00	$13 67	$250 00	$8 15	$190 00	$7 79
NE¼ 23 22 34	450 00	16 15	250 00	8 15	190 00	7 79
SW¼ 23 22 34	450 00	13 67	250 00	8 15	190 00	7 79
SE¼ 23 22 34	450 00	16 15	250 00	8 15	190 00	7 79
NW¼ 25 22 34	450 00	16 15	240 00	7 94	165 00	8 41
NE¼ 25 22 34	450 00	16 15	240 00	7 94	165 00	8 41
SW¼ 25 22 34	450 00	16 15	280 00	9 26	215 00	10 96
SE¼ 25 22 34	450 00	16 15	240 00	7 94	165 00	8 41
NE¼ 8 23 23	500 00	8 45	240 00	7 34	150 00	6 74
NE¼ 10 23 34	600 00	10 14	300 00	8 28	175 00	7 87
NE¼ 12 23 34	500 00	17 95	300 00	9 93	150 00	6 74
NW¼ 23 23 34	600 00	10 74	260 00	8 98	175 00	6 47
NE¼ 23 23 34	600 00	21 54	260 00	9 38	175 00	6 47
SW¼ 23 23 34	600 00	10 74	260 00	8 98	175 00	6 47
SE¼ 23 23 34	600 00	21 54	260 00	9 38	175 00	6 47

In comparison with these assessed valuations of lands in Finney county may be set the present valuations of lands in Prowers, Bent and Otero counties in Colorado, where the land under ditch is valued at from $50 to $250 an acre, or, as Mr. Swink says, "not less than $100 an acre on an average" (911), and where these lands are upon the tax-rolls of the state of Colorado at an average assessed valuation of $30 per acre.

These few quotations from the testimony of the witnesses introduced, few in comparison to the number that might have been selected, give a general but not at all a complete description of the losses that have been sustained by the state of Kansas and the citizens of the Arkansas valley by reason of the diversion of the waters of the Arkansas river in the state of Colorado. In order to get a full comprehension of this enormous loss, the whole testimony must be read, but enough has been quoted to show that the agricultural interests have been injured the whole length and width of the valley; that the loss to the water-power company at Arkansas City has been very great, and that loss in the western portion of the valley

in Kansas is beyond computation. What the loss of one-third of the corn crop, one-third of the oats crop, one-third or one-half of the hay and alfalfa crop, one-third or one-half of the vegetable crop, throughout the entire agricultural sections of the Arkansas valley, has been in any one year would be beyond calculation; what this loss has been for fifteen years would be almost beyond comprehension. That the business interests of Arkansas City have suffered is beyond dispute (392). The Garden City district in many sections for the last ten or fifteen years has been, we are sorry to say, almost a desert, although the same sections for ten years previous had been a prosperous and well-cultivated garden (1895). The balance of the complainant's testimony on this point, by scores of other witnesses equally observant as those whose testimony has been quoted, fully supports the allegations of the bill, and in fact shows that those allegations were not overdrawn, but told only a part of the real truth, and these allegations and these facts are of such a nature and of such an extent as to warrant the relief prayed for.

The losses sustained in the Arkansas valley are shown and emphasized when placed in comparison with the conditions in the northwestern part of Kansas, and in the valleys of the Smoky Hill, Solomon and Saline rivers. The proof is overwhelming and conclusive that the flow of the Smoky Hill, Solomon and Saline rivers has not diminished in the later years as compared with the flow of the same rivers during the early years (2247, 2254, 2263, 2269, 2275, 2281, 2282). This same proof shows just as conclusively that the bottom lands along these rivers are just as productive through all the later years as they were during the early years. The valleys along the Smoky Hill, Solomon and Saline rivers are very narrow, averaging from half a mile to one or two miles in width. These valley lands along these rivers were first

taken up, settled, and cultivated, and, these lands being very rich and productive, the average yield per acre was very high. When there were no more bottom lands to settle and cultivate, the uplands were patented and sown to crops, but these lands were less productive than the bottom lands, and so the average yield per acre for the counties through which these rivers flow was reduced, as shown by the agricultural reports, but the bottom lands remained all the while as productive as ever. This is the one clear, simple and uniform explanation given by all the witnesses, and especially by Mr. Coburn, secretary of the Board of Agriculture of the state of Kansas, who for a quarter of a century has compiled these reports, showing that the average yield per acre for a whole county has decreased because of the cultivation of poorer and less productive lands, and not because the flow of the Smoky Hill, Solomon and Saline rivers had decreased or their bottom lands had become less productive (2267).

The testimony of Colonel Veale (2248), Mr. Wilson (2257), Mr. Dawson (2263), Mr. Coburn (2267), Mr. Anderson (2270), Mr. Campbell (2275), Mr. Anderson (2281) and Mr. Mitchell (2283) is conclusive upon this point.

Mr. A. M. Campbell, who came to Kansas in 1852 and finally settled at Salina, in driving across the uplands from the Saline valley to the Arkansas valley in about the year 1880, finding the crops on the uplands dead or dying, describes his view of the Arkansas valley as follows:

"Yes, sir, I spoke of going to the Arkansas valley for my wife and seeing the corn growing there. The corn was growing there only in the Arkansas valley. On the hills there was n't any. I had to go over the sand-hills to get to this place, and this place was a point on the line of the Santa Fe road. The road is just one town west of it now. Yes, sir, I did go over to the Arkansas valley at

that time, and there was no corn growing that we could see until we got into the Arkansas valley, no, sir. As to how the corn was looking at that time, oh, it was beautiful. We were perfectly astonished." (2280.)

By all this testimony it is shown that the only loss or decreased yield per acre of agricultural products during the later years as compared with the earlier years is confined to the Arkansas valley, and this decreased productiveness has been caused by the diversion of the waters above.

The narrowing of the river banks, especially from Larned to Arkansas City, and the filling of the river-bed with numerous islands, now permanent and covered with trees, have caused another damage to the state of Kansas and the inhabitants in the Arkansas valley which years ago was little realized or scarcely anticipated. From Larned to Arkansas City, as heretofore shown in this brief, the banks of the river have narrowed on an average perhaps for the whole distance of fully one-third of their original width, and in many places the present channel of the river is not over one-half as wide as it was twenty-five years ago. The very few places where this narrowing of the channel has been, to a certain extent, artificial are so insignificant as to be unworthy of consideration. Because of this narrowing of the river banks, and because of the obstruction of the channel still remaining, when the high water of May, June and July of 1904, and the high water of the spring of 1905, came down the river, the lands along the river banks, and even the towns, were flooded and damaged as they had not been since the great flood of 1877. Scores of witnesses testified that the carrying capacity of the river at the present time, to carry off flood waters, is not more than half what it was during the early years, and that a moderate amount of high water now produces a greater damage

to the lands along the river than an excessively high flood did years ago. The amount of water in the flood of July 7, 1904, was not as great as the amount of water in the flood of 1877, and yet it produced far more damage. The condition along the river because of these facts has become alarming. For fully fifteen years prior to May, 1904, not enough water was flowing in the river channel during the summer months of each year to keep the channel washed out. The banks narrowed, the channel filled up, islands became numerous and were overgrown with shrubs and trees, and when the floods came their only outlet was over the land or through the cities before them. If the river channel at Wichita and for 50 miles above that place in 1905 had remained as it was in 1877, when its condition was shown by complainant's exhibit No. 1, this flood of 1904 would have passed down the river between the banks through an unobstructed channel, and would have passed off without damage. The ordinary water flowing through the channel as shown in plaintiff's exhibit No. 1 would produce a destructive flood, doing wide-spread damage to the lands and cities along the banks when the channel has become obstructed and narrowed as shown in complainant's exhibit No. 41. An even channel 800 feet wide, as shown in exhibit No. 1, will carry off far more water than an obstructed channel 500 feet wide, as shown in exhibit No. 41, and as further shown in exhibits Nos. 57, 58, 59, 60, and 61. The artificial filling of the river banks at the city of Wichita for 200 or 300 feet above the Douglas avenue bridge did not cause the river channel to be narrower, for the one or two individuals who did this merely took possession of land that had been made and left dry by the receding waters of the river. The first span of the Douglas avenue bridge was not removed until after June, 1889 (364), and the river has not narrowed at the Douglas

avenue bridge to the same extent that it has fifteen miles above Wichita, near the land of Mr. Harrison (274), or a mile below the Douglas avenue bridge, at the home of Mr. Morgan (2185), or three miles below the city of Wichita, at the Lawrence avenue bridge, near the lands of Mr. Mead (2134). The Arkansas river through the state of Kansas being a navigable river under the laws and the rules of the different departments, it may be a question as to whether the attention of the United States government should not be directed to this existing condition. Whether this be done or not, it certainly shows the effect throughout the state of Kansas produced by the diversion of the water in the state of Colorado. The testimony was harmonious, uniform and conclusive that the narrowing of these banks throughout the whole distance, and the formation of these many islands and their covering themselves with verdure and trees, have all taken place within the last fifteen years, coming immediately after the diversion of the water in Colorado, and as its necessary and inevitable result. We do not say that the state of Colorado and the ditch companies intended all these results, with any malicious desire to injure their neighbors lower down the stream; but whatever their intentions were the results followed, and have been only imperfectly and faintly set out in the evidence and described in this brief.

That these countless and continued losses and these increasing dangers have not caused wholesale devastation and greater abandonment of accumulated property in the Arkansas valley is striking and forcible evidence of the natural richness and fertility of the soil in this part of the state of Kansas, and also shows the patient endurance, the energy, the forbearance, the tact and the power of adaptation on the part of the inhabitants who had taken prior possession of the Arkansas valley. Different ones had protested to the United States depart-

ments again and again, but a state cannot be sued by individuals, and the injuries continued and increased. But Colorado should not be heard to say that further patience would be a virtue, or further acquiesence would be commendable. These injuries can be relieved ; the damages can be repaired ; Colorado can make restitution ; all necessary parties are before the court ; the water is there, and can be conserved and distributed for the benefit of all, restoring and protecting all prior rights, and may be so used as to increase and further develop the later accumulations. Rigidly following the law of the land will return what has been taken, and will be a protection in the future for all the interested parties.

SEC. 17. The Conditions in Nebraska.

The evidence concerning the diversion of waters in the crest state, to the detriment and injury of states below, other than between the states of Colorado and Kansas, was introduced by the intervenor in this case. This evidence was skilfully arranged and presented by witnesses, many of whom have had the best scientific and technical training ; and while this evidence would not have been competent upon the direct issue between Kansas and Colorado over the Arkansas river, yet, by the intervention of the United States government and the evidence introduced on its behalf, the range of the testimony has been widened until it covers every state and territory west of the Missouri river. Of course, we realize that this branch of the case is to be presented by the intervenor itself, but we do not believe that we will be open to criticism if we refer to a few of the facts disclosed by the witnesses for the intervenor, and especially is this true when the facts there disclosed are so closely allied to the facts disclosed by witnesses concerning the conditions in the Arkansas valley.

The conditions concerning the South Platte river, which rises in Colorado and flows into Nebraska, are quite similar to the conditions along the Arkansas river. The South Platte river, from its source near the head waters of the Arkansas river, in the mountains of Colorado, down to its junction with the North Platte river, near the middle of the state of Nebraska, is more nearly like the Arkansas river than any other river described in the testimony. Its underflow, however, is not so marked. The South Platte has one feature, however, that is entirely similar to the Arkansas river, and that feature is that its waters have all been appropriated in the state of Colorado, to the detriment of the inhabitants below. The evidence concerning the South Platte river and the other rivers in Nebraska is not as definite or as extensive as the evidence concerning many other rivers; still it is sufficiently comprehensive to enlighten all parties concerning its condition.

Mr. Dunton, a witness for the intervenor, says:

"As to the extent to which the waters of the South Platte have been appropriated in the state of Colorado for irrigation, I will say there is practically no water at all flowing across the state line during the summer season. It is only in the winter-time and time of very unusual floods that there is any water at all flowing in the river at the state line. It is a dry bed of sand. You might say that the total flow of the South Platte river has been appropriated in the state of Colorado, and there is practically no water at all in the summer season during July and August at the state line. This total loss of water at the state line is caused by the diversion of water for irrigation purposes above that point." (1070.)

Mr. Dunton further says:

"From my information, the time when the period of low water manifested itself in early years is extended over a much longer period now than it was in the early days when no diversions were made from the river. It

is my judgment that the flow of the river has been materially diminished because of the taking of water in Colorado." (1071.)

There seems to be something of an underflow along the South Platte river, but not so marked or extensive as along the Arkansas river, and of this underflow Mr. Dunton says:

"The source of the underflow is like all of those Western streams—the snow in the mountains forms the principal supply." (1072.)

Again, he says:

"The stream is largely over-appropriated in every district in the late season in Colorado, and they get every drop of water they can out of it, and the effect of this is that there is nothing but a dry bed of sand from Julesburg to the junction, which I should roughly guess is about 100 miles, and the effect of this reduction is that there is no water that flows across there at all." (1072.)

He says further:

"There is probably an average of one-third of the water diverted seeps back into the river. If these diversions should be repeated over and over as you go down the river, undoubtedly it would be possible to divert the entire body. Of course, in times of flood that is another thing. The only seepage water that would go on down the stream, so as to be a part of the flow, would be the seepage from the ditches lowest down. The seepage water, to get back into Nebraska so as to affect the flow in that state, must come into the river below the head-gate of the lowest ditch; if the lowest head-gate is taking all of the water in the stream, the seepage that will get back into the river so as to affect the flow of the river below must be below that head-gate." (1072, 1073.)

"The year 1904 has been called a very wet year, or a pretty good year, yes, sir. The seepage in the eastern district of Colorado on the South Platte river is about all the water they get when it is so computed in the summer season. Their ditches have a capacity to take

all of that seepage water, so that it does not allow any to flow on down below." (1076.)

A further description of the effect upon the streams rising in Colorado and flowing into Nebraska is unnecessary on the part of the complainant.

SEC. 18. The Conditions in Wyoming.

The conditions in Wyoming, because of the diversion of the waters of interstate streams in the upper state, has become almost as critical as between Kansas and Colorado. It was developed by the evidence of Prof. Elwood Mead, one of the witnesses for the intervenor, that the legislature of Wyoming, in 1897, made an appropriation of $2500, and directed the attorney-general to bring suit against the state of Colorado on behalf of the state of Wyoming, to enjoin the diversion of water in the state of Colorado upon those streams that rise in Colorado and flow into Wyoming, to the detriment of the prior rights established by the citizens of the lower state (1423). If that suit had been instituted and prosecuted to a final issue it may be that the present action would have been unnecessary. But for reasons explained no suit was filed. The conditions, however, that authorized the legislature to act in 1897 have existed down to the present time, and have become even more aggravated. Within the last year many complaints have been made by citizens of Wyoming because of the diversion of the waters of the streams rising in Colorado and flowing into Wyoming, and one of these complaints found its way into the United States circuit court for the district of Colorado, and was decided in favor of the Wyoming complainants against the Colorado defendants. This is the case of Hoge v. Eaton, 135 Fed. Rep. 411. That this case was reversed by the United States circuit court of appeals because of lack of jurisdiction does not decide that the

complaint was not well founded or the judgment upon the facts properly rendered. The witnesses from Wyoming, introduced on behalf of the intervenor, without exception show how dependent the property rights in Wyoming are upon the flow of the interstate streams as they were when they made their appropriations in that state, and are just as emphatic that these property interests in Wyoming would be either injured or ruined by later diversions of water from these streams in the state of Colorado (1056, 1059, 1070, 1270).

Mr. Johnston, the state engineer of Wyoming, says:

"Both branches of the Platte river rise in Colorado and flow into Wyoming and then into Nebraska, the South Platte flowing from Colorado into Nebraska directly. If all of the water in the branches of the Platte is appropriated and actually used in Colorado, it would destroy all agricultural development both in Wyoming and Nebraska, and prevent any future development, and destroy the property already in existence to a large extent." (1026.)

Upon the question of loss of water by evaporation, Mr. Johnston says:

"Undoubtedly that larger percentage of the water which is used for irrigation is lost through evaporation. There is no question in my mind about that, and it would be my judgment that it runs from seventy to eighty-five per cent., from the figures I have been able to secure; that is, that seventy to eighty-five per cent. is either lost by evaporation from the ground, from the surface of the water in ditches, or through plant life, or escapes underground in a way that cannot be accounted for." (1029.)

Mr. Corthell, of Laramie, Wyo., says:

"The waters of the South Platte are pretty nearly all taken out up here in Colorado. There is very little flowing down about Julesburg." (1036.)

Mr. Downing, secretary of the Wyoming Central Land

and Improvement Company, and also of the Pioneer Canal Company, says:

"The appropriation of waters in Colorado from this stream during a number of years has made us short of water, and if the ditches being built now by Colorado parties are carried through we will have but a very small quantity of water. And this would make the 20,000 acres of land now being irrigated comparatively of no value. These lands are now worth from twenty to seventy-five dollars an acre. If this threatened appropriation in Colorado should be carried out they would be worth from about seventy-five cents to one dollar and twenty-five cents an acre. . . . Besides the 20,000 acres under the two ditches spoken of, there are a good many thousand acres that would be situated the same as we are, which we do not own. If these ditches in Colorado should be constructed as proposed, there would be approximately 200,000 acres of land in Wyoming along the Laramie river affected by it. That would also make the lands situated in Wyoming along other and similar streams, about which I have testified, comparatively of no value should the same conditions be carried out." (1045.)

Judge Clark, of Cheyenne, says:

"If all of the waters should be taken in Colorado from the Laramie river, the greater part of this 200,000 acres, except that immediately on the stream, would become absolutely arid, incapable of supporting anything." (1050.)

The further aggression of the Highlander upon the vested rights of the Lowlander in another state was enjoined by a decree of the circuit court of the United States for the district of Colorado, in the case of Hoge v. Eaton *et al.*, 135 Fed. Rep. 411. With a change of compass, the facts in the case of Hoge v. Eaton *et al.* were the same as the facts in the case of Howell v. Johnson, 89 Fed. Rep. 556, the aggression in this case coming from the north instead of from the south.

SEC. 19. The Conditions in Montana.

The conditions in Montana are quite similar to the conditions in Wyoming, and the complaint about later diversions of water by the upper state exists there as well as elsewhere. We find some of these conditions described in the case of Howell v. Johnson, 89 Fed. Rep. 556, where the plaintiff was a citizen of Wyoming and the defendants were citizens of Montana. The plaintiff had prior rights in the lower state, which were invaded by subsequent appropriations in the upper state, and the defendants' demurrer to the plaintiff's bill was overruled. In Montana, however, there are questions that are also international in their bearing. The Milk river rises in Montana, flows into Canada, back into Montana, and then empties into the Missouri river (1270, 1273, 1318). The water was first appropriated in the state of Montana, below the point where it returned to that state, but subsequent appropriations in Canada have injured the prior appropriations in Montana. Upon this point Mr. Newell, chief of the irrigation service, says:

"This involves an international difficulty with Canada, as the Canadians recently constructed a canal from Milk river which may seriously interfere with the present use of the water in the Milk river valley, and there is thus brought in an international question involving diversion of streams as between nations." (1270.)

Mr. Newell further says:

"Canada has already given to a company the water of Milk river, and that company is proposing to take it out, to the detriment of present settlers in the Milk river valley in northern Montana. The present settlers on the Milk river in Montana are prior appropriators to the ones who now propose to take it in Canada. I understand this difficulty is before the State Department." (1273.)

The other conditions in Montana need no description at this time.

SEC. 20. The Conditions in New Mexico.

No more interesting testimony was introduced in this case than was offered by the witnesses for the intervenor describing the conditions in New Mexico. Some of these conditions are only to be equaled by the conditions of the Arkansas valley. We shall refer to only one single fact, leaving the discussion of this branch of the case to the intervenor, where it belongs. It is, however, shown by the witnesses in New Mexico that the flow of the Rio Grande through New Mexico has been interfered with and lessened by subsequent appropriations in the San Luis valley, in Colorado, almost to the same extent that the Arkansas river has been lessened in the state of Kansas. Irrigation along the Rio Grande, through the central portion of New Mexico, has been in existence for more than 200 years, and the testimony of many witnesses there discloses the fact that the subsequent appropriations to irrigate the 197,000 acres of land irrigated in the San Luis valley have deprived the Rio Grande of the natural flow of its waters through the growing season of the year, until from ten to forty per cent. of these irrigated lands through the central portion of New Mexico are now dry and abandoned (1112, 1141). The extent to which the subsequent appropriations in the San Luis valley have interfered with the flow of the Rio Grande through New Mexico would make interesting reading, if it were not for the fact that the destruction has been so extensive. That the appropriations along the Rio Grande have interfered with the prior rights in the domain of old Mexico is a matter of common knowledge, and out of this grew international complications with Mexico. The International Boundary Commission has made its report, but many of the complications remain still unsettled (1140, 1143, 1147, 1152).

Governor Otero, of Santa Fe, says:

"Recent appropriations from the Rio Grande in Colorado have affected the appropriations in New Mexico below the state line. Such diversions in Colorado have affected the flow of the river by taking the water out of the streams that run into this territory here, and have often had the Rio Grande dry as far as Albuquerque; that is, the water could not get down any further than that. . . . The irrigation that produced this effect was located in Colorado." (1077.)

Mr. Foster, of Los Lunas, the president of the Agricultural College of New Mexico, and director of the Agricultural experiment station for the United States government, says:

"As to the effect that irrigation in Colorado has had upon the flow of the Rio Grande, it is the general understanding among our people that on account of this irrigation in Colorado we are short of water, and that is why the Rio Grande goes dry during our crop season. It is my understanding that the Rio Grande has gone dry only since the irrigation on the upper reaches of the Rio Grande." (1081.)

Mr. Catron, of Santa Fe, says:

"The taking of the waters of the Rio Grande in Colorado by means of those large ditches has almost destroyed the prior irrigation that had been carried on in the Territory of New Mexico from about the middle of the Territory south. . . . I never heard of any failure of the water of the Rio Grande clear to the southern line of this territory until they appropriated those waters up there." (1093, 1094.)

Mr. Pedro Perea, of Bernalillo, says:

"I think the taking of the waters in the state of Colorado and appropriating them, as I understand it has been done in the San Luis valley, has affected irrigated farms in the Territory that were in existence prior to the taking of the water in Colorado. The taking of that water has arrested the further development of irrigation

along the Rio Grande in the Territory of New Mexico." (1106.)

Mr. Solomon Luna, of Los Lunas, says:

"I should judge there are about 20,000 acres of irrigated land in Valencia county. The irrigated lands in that county have decreased within recent years about one-third. That is, there is one-third less land cultivated now than there was then. The decrease began about 1882. There is not as much water in the Rio Grande as it passes through Valencia county as there was in former years. . . . The only reason I can give for the decrease of the water in the Rio Grande in Valencia county is that the water has been taken by those canals in Colorado. The stream began to diminish when they began to take water out up in Colorado. And it has continued to decrease ever since. We have lost every year. The irrigated area has decreased in Socorro county, which adjoins Valencia county on the south, and also Donna Ana county, the county adjoining Socorro on the south. I should judge the percentage of decrease in those two counties has been about forty per cent. The reason for this is on account of lack of water." (1109.)

Mr. Luna further says:

"The further south you go on the Rio Grande, in New Mexico, the greater the percentage of the land which is short of water for irrigation, and in this Indian grant I spoke of there has been about 10 per cent. gone out of irrigation that was formerly irrigated. The next below that is Valencia county, and there is about $33\frac{1}{3}$ per cent. less irrigated than formerly. In Socorro and Donna Ana counties there is about 40 per cent. less. I don't know that this proportion increases south of Donna Ana county. Of course that is the last county south." (1112.)

Similar conditions are described by other witnesses (1099, 1123, 1125, 1130, 1135).

The Highlanders' depredations on the south seem to have been equaled only by those on the east, while those on the north differ only in extent and continuation.

SEC. 21. The Conditions in Other States.

Witnesses were introduced by the intervenor in this case from all of the states west of the Missouri river, and the conditions were fully described in the Dakotas, Idaho, Washington, Oregon, Nevada, California, Utah, Arizona, and New Mexico. These conditions were described as similar to the conditions in Nebraska, Wyoming, and Montana. The evidence given by Mr. Newell, chief engineer of the Reclamation Service and Geological Survey, was a full and comprehensive statement of the conditions, the contentions and the difficulties existing in these different states, as well as a complete statement of the aims and purposes of the reclamation service in carrying out the beneficent provisions of the act of June 17, 1902. Quotations from this testimony cannot be made doing justice to the extensive projects now under consideration or already entered into by the reclamation service, and we can but call attention to the importance of this testimony, beginning on page 1267 of the abstract. Perhaps no more far-reaching or beneficial act of Congress was ever passed than the reclamation act of June 17, 1902, or one that will bring larger results for the money invested or the energies expended. It is the unvarying testimony of all these witnesses that if the contention of the defendants in this case should prevail, that, by reason of her sovereignty, her constitution, her laws, and her needs, the state of Colorado owns and has a right to control the waters of the Arkansas river within that state, the injury to all below the crest states would simply be beyond calculation. If the state of Colorado should prevail in that contention, set up as a defense in her answer filed in this action, it would limit the operations of the reclamation service practically to the state of Colorado, or at least to those states where the interstate streams rise.

Upon this point Mr. Johnston, the state engineer of Wyoming, says:

"It is my judgment that, as a matter of justice, there should be some control over interstate streams—as a matter of justice to the appropriators who have gained rights to use the water by actual beneficial use—and that control should go as well to the benefit of the parties who at a prior time had settled on a stream below as though it were invoked in favor of prior appropriators who had settled above. In other words, I think that some equitable control should be exerted and exercised over those streams in favor of the real rights of the parties that exist, as against subsequent rights that grow up, to their injury." (1026.)

Mr. Corthell, of Laramie, Wyo., says:

"If this doctrine of Colorado be carried out it might affect the reclamation service upon every stream flowing from Colorado into Wyoming. This would also be true in all cases where the claims were made by the superior states that they owned the body of water arising within their borders. This would affect the reclamation service in the western portion of Nebraska, the same as in the state of Wyoming. This would also be true of every state lying below the state of either Colorado or Utah, or the mountain states where the streams happen to rise." (1039.)

Judge Clark, of Cheyenne, Wyo., says:

"No, we never believed and we do not now believe that that mere declaration on our constitution gave to the state or was the assertion on the part of the state of a property right in the water such as the state acquires in or to lands which, for instance, had been granted to it by the government, or buildings which have been erected on such land, or anything of that sort, but simply that it gives the state the right to control these waters so far they may be applied to beneficial use" (1049). "It was my opinion from the very beginning that if parties in Nebraska had appropriated the waters of the Platte river and used them for beneficial pur-

poses they would have a superior right to subsequent appropriations of the same waters in the state of Wyoming under the constitution and laws of Wyoming; and, of course, under similar circumstances I would hold that the same view as to prior appropriators in Kansas as against subsequent appropriators in Colorado under their constitution and statutes should prevail." (1054.)

Mr. Van Orsdel, attorney-general of Wyoming, says:

"If the Colorado doctrine, that she has the right to take all of the water of the streams that rise within her borders, by virtue of her constitution and laws, should be applied to those streams that flow from Colorado into Wyoming, it would have a serious effect on carrying out the reclamation of the lands that I have just spoken of under the reclamation act. There is no doubt about that. I am familiar with the constitution and the laws of Wyoming, and as to the ownership of the water, there is a similar provision in the Wyoming constitution to that in the constitution of Colorado. I do not think it is a correct construction of the constitution of Wyoming, nor is it a construction that is now generally held, that if parties in the western part of Nebraska had appropriated certain waters of the North Platte river, or any other river flowing from Wyoming into Nebraska, Wyoming or any of its citizens would have a right to subsequently appropriate all of the waters of those streams by virtue of her constitution or her laws. In fact, our supreme court in a recent case has announced very clearly that doctrine. I think that decision as announced by the supreme court has been very generally accepted by the bar and the people at large in the state of Wyoming. . . . The case decided by the supreme court of Wyoming that I have referred to is Wiley v. Decker, 73 Pac. 210." (1056, 1057, and 1058.)

Mr. Johnston, of Wheatland, Wyo., says:

"If the Colorado doctrine of the right to take all of the waters of a stream rising in the state of Colorado and flowing into another state, by virtue of her sovereignty and her constitution, should prevail, it would

ruin our improvement company and our progress and the property that we have been accumulating. I should say that the same result would follow as to other streams similarly situated." (1059, 1060.)

Mr. Fellows, the district engineer of the United States reclamation service for Colorado, says:

"We have no projects on hand at the present time in the Arkansas valley. One reason is that we did not care to undertake any as long as this controversy was under way, which was begun before the reclamation act was passed. No projects could be reasonably begun and carried out in the Arkansas valley until this controversy is settled, nor would we undertake any until the settlement of the controversy. We have made investigations on the Arkansas river, but have determined on no projects. We have not determined upon any construction whatsoever, nor seriously considered it, until this controversy is settled, and our investigations are now being held up on that account." (1063.)

Mr. Hall, supervising engineer for the Territory of New Mexico for the reclamation service, says:

"This Colorado doctrine would interfere with the carrying out of the reclamation of the lands in any of the states lying below Colorado along the streams that rise in Colorado, or in any other state that lies above the one where the reclamation projects are in contemplation." (1143.)

Mr. Maxwell, of California, chairman of the irrigation committee of the National Irrigation Association, says:

"As to what would be the effect upon the lower states if the mountain states had the right to take and control all of the waters that rise in them, assuming that they did take it all, and apply all of those waters to uses for irrigation within their own borders, of course it would be destructive of all irrigation development in the lower states. I think that nearly all of the streams on the west side of the Missouri river rise in what is known as the arid region. If the right to use all of those waters

were confined to the crest states, of course it would have a very detrimental effect upon any of the lower states, to the extent of the destruction of their irrigation interests, which would have been extensive if those waters had continued to come down. And this would destroy all agricultural development dependent upon irrigation from the rivers rising in the crest states. If Colorado and Wyoming should take all of the water, and dry up irrigation in other states, the detrimental effects would reach from Maine to the Pacific ocean, from Canada to New Orleans. You cannot limit it. The commerce, transportation and industrial interests of the country are so closely interwoven that you cannot destroy any part of the country without affecting the entire country, and the effect is necessarily relative. It would have an enormously detrimental effect upon all the property of Nebraska that was not created by irrigation if Colorado and Wyoming should divert all of the waters that rise within their borders and flow down. The same effect would apply to Kansas. Under this claim, it, in my judgment, would render the national irrigation act practically inoperative. This would be the effect of such a claim, if fully carried out, upon the three states of Nebraska, Kansas, and New Mexico, and I would prefer to confine my answer to those three states, because I do not know that you could say that there are other states similarly situated." (1167–1168.)

Mr. Mondell, of Newcastle, Wyo., says:

"In respect to the preparation of the reclamation act, and as to the intention in framing and passing that act, that one state should have the right by virtue of her state sovereignty and her constitution to take and appropriate for irrigation purposes all of the waters that fall within her borders, regardless of the prior conditions of the people and of the settlements below the borders of that state on streams flowing from the upper state into the lower state, I will say, as a member of the committee that framed the law, that it was not my thought or intent that we should by the passage of that legislation encourage that kind of practice. If any state were to insist upon and uphold the diversion of waters en-

tirely regardless of prior appropriators in another state below, and that were carried out, it might entirely deprive the settlers in the lower state down the stream, under a government project, of their water, or even under a private project, if the conditions were carried out in the upper state. If such a claim as that should be made and carried out by the upper state, without regard to the prior appropriators in the adjacent state farther down the stream, I should say it would have the effect of contracting the reclamation service to the upper state, and it would have that effect very largely in the states farthest down on the interstate stream." (1182, 1183.)

Senator Dubois, of Blackfoot, Idaho, says:

"I do not think it was contemplated by the reclamation act that the crest state should have the right to subsequently take all the waters of an interstate stream, to the damage and detriment of prior property interests in the lower state. It was not thought by those who framed the reclamation act that the crest state should have the right by virtue of her state sovereignty to own and control all of the waters of an interstate stream that rises within her borders, to the detriment and injury of prior appropriators or prior property rights along the streams below those crest states. That was not the intent of the act." (1193.)

Mr. Dixon, of Missoula, Mont., says:

"In fact, the members of Congress from Montana have had this matter up with the secretary of state, and are trying to arrive at some agreement with the Canadian government at this time. There is a large irrigation project, embracing, as I now remember, about 400,000 acres of land along the Milk river, which has been held in abeyance on account of the complication over the waters of the Milk river being threatened by the Canadian settlers on the Canadian side, and this controversy is pending at this time between the British government and the United States government. There has been a protest made on the part of the citizens of Montana against the taking of the flow of the stream in Canada,

to the detriment of citizens who have made prior settlements in the state of Montana. The State Department has taken the matter up. The larger part of the water has been appropriated on the American side prior to the settlements in Canada. If the state of Montana should appropriate and take for irrigation all of the waters that rise in Montana and flow into the Dakotas in the Missouri and Yellowstone, on the Montana side, and use them there, the people of North Dakota, of course, would have no river when it got down into the Dakota territory. This would depreciate their property and their interests. In saying that I was in favor of a large and beneficial use of the water in Montana for irrigation, I do not wish to be understood that I was in favor of such a use as would destroy prior civilization in other and lower states. In carrying out the projects in process of development under the reclamation act and the reclamation service, we would have to recognize the prior right of the appropriator in the state lower down the stream. That would be the equitable method." (1199, 1200.)

Senator Warren, of Wyoming, says:

"As to the effect upon the reclamation act, and the reclaiming of arid lands under it, if the upper state had the right to own and control all of the water that fell within its borders, and if it did actually take and apply to irrigation within its borders all the water that fell within that state, I will answer, first, that the act of Congress does not provide that, because the act is one recognizing priority of rights, and the expectation is that the state below may go into the state above and take out the water, if it is a matter of prior entry and application." (1291.)

Ex-Senator Carey, of Wyoming, says:

"No, sir, I never heard such a claim as that made in the state of Wyoming. Our constitution was not framed with the intention of taking the water away from somebody else after they had appropriated it, although the lower appropriator might have been located in the state below. No, sir, when our constitution

was framed, and when our state has developed in all its resources as I have described it, it has not been upon the theory that that state or a citizen of that state could, by virtue of its constitution, now claim to own and control all of the waters that rise in our state solely by virtue of state rights or state sovereignty. The whole theory of it is that prior appropriation of water of course gives the party the right—the man who appropriates it—gives him the right in the water forever for that purpose, regardless of state lines. Yes, sir, it was undoubtedly correct where I referred a few moments ago in my testimony to an apportionment between the states of Wyoming and Nebraska for the benefit of both states, that it was upon this theory that I have just described. I believe that that is the only theory on which the arid states can be developed." (1328.)

Other witnesses testified to the same effect. Mr. Jones, of Washington (1173); Mr. Bell, of California (1177); Mr. Needham, of California (1204); Senator Hansbrough, of North Dakota (1213); Major Brodie, of Arizona (1261); Mr. Alexander, of Arizona (1264); Mr. Code, of California (1319.)

Enough has been here quoted to show that the Colorado doctrine set up in this case would be equally destructive on all sides of the crest states; and if that doctrine should prevail or longer continue, numerous states and territories would have the same causes of complaint that are alleged in the bill filed in this case, and the operations under the reclamation act would be limited and confined to a single state and the region of greatest elevation.

SEC. 22. The Conservation of Interstate Waters.

The bill of complaint in this case was filed on the 20th day of May, 1901, and the demurrer, filed by the state of Colorado, was overruled on the 7th day of April, 1902, and the opinion of the court was filed on that day. The Congress of the United States was then

in session, and on the 17th day of June, 1902, the reclamation act was passed, and, after the issues were joined between the complainant and the defendants in this case, the United States intervened and set up their interests in this controversy. The reclamation act applies to the public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, and the fund collected under the provisions of this act has amounted to about $35,000,000. It was abundantly proved by the witnesses for the intervenor that if the Colorado doctrine, as announced in this case, should be sustained, the reclamation of these arid lands would be a failure, and the whole reclamation projects would be limited, restricted and confined to the one or two crest states where the interstate streams take their rise. Such construction and such a limitation of the reclamation service would be worse than though no act had been passed; for while such a limitation might assist a few very small, arid valleys in the upper states, it would work boundless and unlimited injury to all the lower states, and the injury in the states below would overbalance the advantages in the states above them many times over. If, however, the ruling of the court upon the demurrer should remain, and if the surplus waters of interstate streams should be impounded in reservoirs, wherever sites can be found, and then used anywhere along the stream according to prior rights, whatever the form of those rights may be, regardless of state lines, then the questions of law in this case become simple and easy of solution, and the improvement and development of the arid lands in the states mentioned would become merely engineering and agricultural problems, to be solved under the provisions of the act of June 17, 1902.

None of the waters of any of the interstate streams in any of the states mentioned in the reclamation act should be allowed to run to waste. The surplus and flood waters of all these streams should be impounded wherever reservoirs can be economically and profitably built, and these impounded waters should be used to irrigate the lands below according to the vested rights, wherever those lands may be situated. Enough water has run to waste down the Arkansas river every spring to irrigate every valuable foot of land along the Arkansas river between Canon City, Colo., and Dodge City, Kan. These surplus and flood waters may be treated as a natural enemy, and should be impounded and used for the benefit of all.

According to the testimony of Mr. Fellows, the United States district engineer for the state of Colorado, no projects have been entered into under the reclamation act along the Arkansas river for the impounding of these surplus waters, because of the pendency of this suit (1063). The evidence of all the parties to this action abundantly shows that no lands in any of these states named, and which are open to further and future development, are richer or more favorably located than those along the Arkansas river. Mr. Henry, a witness for the state of Colorado, and one of the most widely experienced irrigators living, says:

"It is not an easy matter to draw a clear distinction between 'high water' and 'flood waters.' I think it may answer the purpose to say that a 'flood' is such a volume of water as would overflow the banks of a stream or its tributaries; and 'high water' is a volume of water above the average flow or normal flow, but such a volume as would not overflow the banks. . . . In Colorado, for instance, most of the large impounding reservoir enterprises in the future will be located across the valleys of the tributaries and not out on the plains. The fall of the country — the

grades—being too great to warrant the hope of any considerable area being so employed; but in the valley of the river in Kansas the grades of the river are low and the valley wide. The banks of the river are low and conditions favorable for carrying out intakes to reservoirs which may be built; so that eventually, and at present, if the intensive agriculture which could and should be adopted there were in vogue, reservoirs could be built at comparatively little expense in the valley of the main river itself, and then these high waters and flood waters could be used for the irrigation of lands in Kansas. In my judgment, that is the practicable thing to do. . . . I don't think that the conditions of the Arkansas river, either in the state of Colorado or in the state of Kansas, are the best that can be had. The river can be artificially made better and more profitable for the people of the state of Colorado and the state of Kansas. I think it would be wise and profitable to direct our energies to that end." (714, 715, 717.)

It is unnecessary for us at this time to quote further from the voluminous and encouraging testimony upon this point. The Colorado or Bob Creek canal is supplied through the dry season of the year, when there is no flowing water in the Arkansas river, by the Twin Lakes reservoir, located more than 150 miles above the head-gate of the canal, in the mountains near Leadville (767). The Colorado Fuel and Iron Company stores in reservoirs immense quantities of water every year for the use of the steel works at Pueblo (731). The Greeley district in Colorado, now grown to be famous because of its production of potatoes and all kinds of vegetables and small fruit in the later years, is supplied by a great number of small lakes, ponds, or reservoirs, impounding and holding back the surplus water in the wet season of the year for use during the dry season of the year. The testimony of all the witnesses shows that a much larger area can be irrigated by the surplus

waters when impounded than could be irrigated by the much smaller amount of water that flows in the streams and rivers during the dry or maturing season of the year. This, as we understand it, is the main purpose and object of the reclamation act, and if these surplus or flood waters should be impounded anywhere where reservoir sites can be found, and then be used where they can be most economically and profitably applied, according to the prior vested rights, and regardless of state lines, then the provisions of the reclamation act can be fully carried out and bring unending benefits.

SEC. 23. The Summary of Facts Proved.

The evidence clearly and conclusively establishes the following main or probative facts:

FIRST. The flow of the Arkansas river in Kansas down to a point near the city of Wichita is almost wholly supplied by the precipitation in the mountains, foot-hills and uplands of Colorado, and no appreciable portion of it from tributaries or drainage in Kansas. That hence any diversion or interruption of this flow in Colorado directly and correspondingly diminishes the flow in Kansas by cutting off its only supply.

SECOND. The Arkansas river in Kansas throughout most of its course runs upon a ridge formed by its own deposits, higher than the country on either side, receiving but slight additions from its ostensible tributaries, aside from the water furnished these streams from its own underflow.

THIRD. Beneath the bed of the river, and extending to the upland on either side, is a vast stream of underground water, well defined, flowing through a stratum of coarse gravel, following the general course of the surface stream, and moving to the sea with a steady appreciable current of from five to twenty feet a day. This underflow depends upon and is fed by the surface river and not by drainage from the surrounding country. Prior to 1887 this underflow provided a sub-irrigation that made large crops of cereals, vegeta-

bles and fruits in the valley with but little precipitation, and rendered the valley lands of great value until it was so far lowered as to be unavailing.

FOURTH. Prior to the diversion of the flow of the river in Colorado there existed a large and valuable water-power at Arkansas City derived from the waters of the river, sustaining important industries and resulting prosperity for that community.

FIFTH. Prior to the destruction of the flow of the river it was practically navigable to a point above Arkansas City, and with a small amount of improvement could have been made navigable during most of the year from Wichita to its mouth, affording cheap water communication to the sea.

SIXTH. Between 1879 and 1883 a large number of irrigation ditches were constructed and maintained in Kansas, deriving their supply of water from the river, making beneficial use thereof, and capable of irrigating 235,000 acres in Kansas. The supply of water for these ditches was ample till about 1888.

SEVENTH. From the earliest times down to the latter part of the eighties the flow of the river was uniform and regular and of a volume sufficient to maintain its bed; to feed its underflow; to sustain its navigability below and the irrigation ditches above; to supply the saturation and nourish the crop yields of its valley; and to maintain the general prosperity of a region containing not less than 2500 square miles.

EIGHTH. About 1885 the present system of irrigation along the Arkansas river in Colorado was begun, and by 1888 it was practically complete. These canals from thence on took, and are now taking, the entire normal flow of the river in Colorado, including their own seepage and return waters, diverting it largely to non-riparian uplands, and almost entirely depriving Kansas of the benefits of the river.

NINTH. As a direct and proximate result of the diversion of the waters of the Arkansas river in Colorado by the defendants, the navigability of the river above Fort Gibson has been destroyed; the natural and normal flow of the river has been materially decreased; the underflow has been lowered until it is no longer available for maturing crops and fruits in the Arkansas valley, greatly lessening the yield per acre and the

value of the lands; the water-power at Arkansas City has been greatly injured; the irrigation ditches in western Kansas have been deprived of their water-supply of long prior appropriation, leaving them ruined, the lands deserted, and the resulting industries and prosperity almost extinguished; the revenues of the state of Kansas and its municipalities along the Arkansas river have been materially decreased; and the general prosperity of a vast region and of a considerable population has been impaired beyond computation or any measure of exact definition.

III.

THE LAW OF THE CASE.

SEC. 24. The Propositions of Law Involved.

This court, in deciding the demurrer to the original bill, and in passing upon the motion to dismiss filed by the additional defendants named in the amended bill, in a sense reserved all of the legal questions involved for further consideration when the facts should be before the court. It was held that the bill presented a justiciable controversy worthy the attention of the court, but withheld a final judgment as to many of the legal questions involved. We therefore feel that we are not justified in relying, as to the legal propositions, either upon our former brief, or the decision of the court upon the demurrer. Few, if any, new questions are presented, but the old ones are presented in a new light, with additional force, and with added relationships. We shall, therefore, as briefly as possible, discuss what appear to us to be the legal questions involved in this record, and the legal principles to which this court must resort in its final decision upon the merits. As concisely as we can state them, they appear to us as follows, each of which will be discussed as a separate subject:

FIRST. The state of Kansas may maintain this suit, first, by virtue of its own sovereignty; second, as the owner of the bed of the Arkansas river; third, as the owner of riparian lands in the Arkansas valley; fourth, as *parens patriæ*, guardian or trustee, for any considerable portion of its territory or citizens affected by any unlawful diversion of the waters of the river; and fifth, because its revenue derived from taxation has been directly diminished by such diversion. Such cause is justiciable in this court, the defendants are

each necessary and proper parties, and this court has jurisdiction and power to grant relief.

SECOND. The common law, including the doctrine of riparian rights as therein formulated, embraced the whole territory involved in this controversy down to August 1, 1876, when Colorado became a state. Many of the rights herein claimed were vested in the complainant and those for whom it sues before that date, and all the rights claimed were vested before the injuries complained of, and could not be changed or divested by subsequent customs or enactments in Colorado without the consent of the vested owners of those rights.

THIRD. The right of the complainant and those for whom it sues is a right to the usual and normal flow of the river "as it was accustomed to run" during ordinary years prior to the unlawful diversion complained of and exclusive of floods and unusual high waters.

FOURTH. The right of a riparian owner on a stream to its flow as it was accustomed to run does not depend upon his use of the water, but special damage caused by diversion furnishes additional ground for relief.

FIFTH. The underflow of the Arkansas river in Kansas is a well-defined subterranean stream, distinct from underground or percolating waters, the right to which vests in the owner of the surface, and its unlawful diversion, deprivation or diminution is a substantial wrong for which equity will grant relief.

SIXTH. The use of the water of the river for water-power at Arkansas City became a vested right, and as to that right the subsequent diversion of the water by Colorado, decreasing if not wholly destroying such water-power, is a continuing wrong which equity will enjoin.

SEVENTH. The state of Kansas has a vested right in the system of irrigation in western Kansas, and may maintain and protect such system, affecting a large part of its territory and a great number of its citizens, by any appropriate action.

EIGHTH. In considering the rights herein claimed and the wrongs thereto, state lines are not to be considered as barriers to such rights or defenses against

such wrongs. But when the rights of the complaining state and the defending state as to the flow of the river are mutually fixed, each may use its own according to its own laws and customs, and the existence of such laws and customs is neither ground of attack nor defense except in so far as it impairs the rights of the other.

NINTH. Treating Kansas and Colorado in all respects as separate nations, and ignoring the vested rights of Kansas under the common law, the contention of Colorado with respect to its right to divert all the waters of the Arkansas river is untenable, and Kansas is entitled to relief.

SEC. 25. The Jurisdiction of the Court.

The state of Kansas may maintain this suit, first, by virtue of its own sovereignty; second, as the owner of the bed of the Arkansas river; third, as the owner of riparian lands in the Arkansas valley; fourth, as *parens patriæ*, guardian, or trustee, for any considerable portion of its territory or citizens affected by any unlawful diversion of the waters of the river; and fifth, because its revenue derived from taxation has been directly diminished by such diversion. Such cause is justiciable in this court, the defendants are each necessary and proper parties, and this court has jurisdiction and power to grant relief.

The question of the jurisdiction of this court over the cause of action presented by the original and amended bill of complaint was exhaustively argued upon the demurrer filed by the state of Colorado, and was practically settled in the opinion of the court, found on page 29 of the printed record, and reported in 185 U. S. 125. The question whether the acts of one state which injure another and adjacent state, and impair the prosperity of its inhabitants, would create sufficient basis for a controversy justiciable in this court, would be readily answered in the affirmative, if regard were to be had

only to the language of the constitution of the United States. Article 3 of the constitution provides:

"The judicial power of the United States shall be vested in one supreme court, and in such inferior courts as the Congress may from time to time ordain and establish. . . . The judicial power shall extend to all cases, in law and equity, arising under this constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; . . . to controversies between two or more states; between a state and citizens of another state. . . . In all cases, . . . in which a state shall be party, the supreme court shall have original jurisdiction."

As shown in the amended bill of complaint, the allegations of which are fully supported by the evidence now before the court, the state of Kansas appears in all of its capacities known to the law, and alleges and has proved that its injuries have been brought about directly by the defendants named in the amended bill. One of these defendants is the state of Colorado, and the codefendants are corporations and citizens of the state of Colorado. Thus, within the language of the constitution above quoted, the court has original jurisdiction of the parties, and, because of the facts alleged and proved, the court has also jurisdiction of the subject-matter of the controversy.

The state of Kansas appears as complainant in this action by virtue of its own sovereignty; by virtue of what it was, what it is, of what it owns, and what it controls. Since January 29, 1861, the state of Kansas has had a general right and supremacy within the domain of its established boundaries, and this right and supremacy include everything that existed at the time of its creation, or has grown up since, and prior to subsequent and antagonistic claims of rights in other states. The state of Kansas has a right to its lands, its prairies, its rivers, its streams, its meadows; to all that is above

and all that is below; to whatever made its substance, its power, its wealth, its beauty; to whatever made up its natural endowment and to whatever became part and parcel of its natural, physical and constitutional existence. These belong to the state of Kansas by virtue of its creation and inhere in its existence, and cannot be impinged upon, altered or marred by a subsequent state or the subsequent acts of outside citizens. It is not the political supremacy of Kansas that has been assailed by Colorado and its citizens, but it is the material supremacy—a supremacy of law, of fact, of property, and prior vested rights. The lands of Kansas have been drained, its water-powers have been impaired, its conduits have been emptied, its rivers have been depleted and its streams dried up, its revenues have been decreased and its domain has been invaded by subsequent and outside forces. The injuries alleged in the bill and proved by the evidence are within the boundaries of the state of Kansas, and affect the rights, powers, interests and prosperity of the state as such, and it has, therefore, the right to appear and maintain this action by virtue of its own sovereign capacity created under the constitution of the United States.

The state of Kansas appears also as the owner of the bed of the Arkansas river. At the time the territory of Kansas was organized, at the time Kansas was admitted into the Union, and for many years thereafter, the Arkansas river within the state of Kansas was considered and treated by the United States government and the state of Kansas as a navigable stream. The facts with respect to its navigability, the appropriations made by Congress to improve the river, are all fully set forth in section 6 hereof, and a repetition of them at this point is unnecessary.

By the surveys of the government, made in 1867 and 1872, extending along the whole length of the river in

Kansas, the banks of the river were meandered. At that time the United States owned the land along the Arkansas river, and it had the right either to meander the stream and call the river navigable, or to survey across it and sell the bed of the stream as land, if it deemed the river to be in fact not navigable. The bed of the Arkansas river between these meandered lines, established by these original surveys, has never been sold by the United States to any person, and has never been conveyed by the United States for any purpose whatever. When the state of Kansas was admitted into the Union the bed of the Arkansas river passed to the state Kansas, and since that time the state of Kansas has never sold or pretended to convey any of the land between the meandered lines establishing the banks of the Arkansas river.

In La Plaisance v. Monroe, 1 Walker Ch. (Mich.) 155, 161, the court said (1843):

"The beds of all meandered streams and navigable rivers belong to the state within which they lie.

"The bed of the stream is public property and belongs to the state. This is the case with all meandered streams, no part of them being included in the original survey."

This fact is recognized by the early statutes of Wisconsin:

"All rivers and streams of water in this state, in all places where they have been meandered and returned as navigable by the surveyors employed by the United States government, are hereby declared navigable to such an extent that no dam, bridge or other obstruction may be made in or over the same without permission of the legislature." (1850.) (Wis. Rev. Stat., ch. 34, sec. 1.)

"It is further insisted by the counsel of the plaintiff in error that, inasmuch as the United States has not surveyed and sold the bed of this stream [the west

branch of the White river, Indiana], it still belongs to the United States and stands on the same foot that the other unsold lands stand on. . . . This position is not tenable." (1833.) (Cox v. State, 3 Blackf. [Ind.] 8.)

"By the acts of Congress regulating the survey and disposal of the public lands, the federal government has renounced the title to the navigable waters and the soil covered by them." (1839.) (Mayor v. Eslava, 9 Porter [Ala.] 577, 604.)

Section 5251 of the Revised Statutes of the United States, 1015, is as follows:

"All the navigable rivers and waters in the former territories of Orleans and Louisiana shall be and forever remain public highways."

In the year 1864 the legislature of Kansas enacted chapter 97, Laws of Kansas, 1864, entitled "An act declaring the Kansas, Republican, Smoky Hill, Solomon and Blue rivers not navigable, and authorizing the bridging of the same" (334). The Arkansas river was not included within the rivers mentioned in this act, and its navigability through the state of Kansas has never been denied nor questioned by any legislative act or judicial decision.

When the government meanders a stream and sells the adjoining land, and treats the stream as if it were navigable, the title to the soil between the meandered lines vests in the state. This has been decided so often that there is no controversy on the subject.

Wood v. Fowler, 26 Kan. 682.
Rossmiller v. State, 89 N. W. 839.
Richardson v. United States, 100 Fed. 714.
Pollard v. Hagan, 3 How. (U. S.) 212.
Martin v. Waddell, 16 Pet. (U. S.) 367.
Packer v. Bird, 137 U. S. 661.
Illinois Central v. State, 146 U. S. 387.
Shively v. Bowlby, 152 U. S. 1.

The state of Kansas also appears in this court as the owner of riparian lands situated along the banks of the Arkansas river. The allegations of the bill were fully sustained by the proof as to the ownership of these lands, and as to their being affected in the same way and to the same extent as the other lands in the Arkansas valley, by the diversion of the water in the state of Colorado. Thus the state of Kansas, in its corporate capacity, has the right of action against these defendants.

The state of Kansas also appears in this action as *parens patriæ*, guardian or trustee, for a considerable number of its citizens and inhabitants occupying a territory which, directly and indirectly, has been affected by the acts complained of, equaling nearly one-quarter of the total area of the state of Kansas. This action was not brought in the name of the state of Kansas for the benefit of any particular individual, any one piece or parcel of land, or for any single business interest, but was brought by the state of Kansas as guardian or trustee of all these citizens, properties and interests in the Arkansas valley and the lands directly adjoining. The state of Kansas in this case is more preeminently the proper party complainant than was the state of Missouri in the case of Missouri v. Illinois, 180 U. S. 208, or the state of Pennsylvania in the case of Pennsylvania v. Bridge Co., 13 How. 519. This clearly distinguishes the right of the complainant to maintain its action from the rights alleged on behalf of the complainant in the cases of New Hampshire v. Louisiana, 108 U. S. 76, and New York v. Louisiana, 108 U. S. 91. This action was not brought against a state officer, or a particular department of an adjoining state, as was the case in Louisiana v. Texas, 176 U. S. 1. In the case of Rhode Island v. Massachusetts, 12 Pet. 657, 726, the court said:

"Bound hand and foot by the prohibitions of the constitution, a complaining state can neither treat, agree

or fight with its adversary without the consent of Congress."

Kansas may not invade Colorado with an armed force to right its wrongs; it may not name plenipotentiaries to meet with plenipotentiaries on the part of Colorado and mutually determine and fix their rights to this interstate stream, rising in one state and flowing through the other. The founders of this government, foreseeing that difficulties between states might arise, wisely provided that they should neither make treaties with nor levy war against each other, but that such controversies should be justiciable in this high tribunal, and that all the remedies formerly available to them as sovereign states by negotiation or war should be available in this court. The furthest limits of controversies justiciable herein have never been defined or fixed by this court, and to what extent states may repair to this tribunal for remedies for wrongs committed against their rights has never been settled. It is sufficient to say that the evidence presented shows no reason why the opinion of the court upon the demurrer should be reversed or modified upon this point.

The state of Kansas also appears in this case alleging and proving that its revenue, derived from taxation, has been directly diminished by the diversion of the waters of the Arkansas river in the state of Colorado. Sufficient proof was adduced upon this point to give the court jurisdiction in this action, if no other allegations had been made and no other proof had been presented.

Such a cause, as is alleged in the bill on behalf of the complainant, is justiciable in this court. It is there alleged that the state of Colorado has directly established, and to-day maintains, a system of irrigation directly impounding the waters of the Arkansas river and diverting them for irrigation purposes, which depletes the entire flow of the Arkansas river, a great interstate

stream, whose diversion causes the damage complained of herein. It was further alleged, and is now proved, that the state of Colorado commenced and partially constructed an irrigation ditch to be supplied with water directly from the Arkansas river, and the completion of this enterprise only waits further action of the legislature. It was further shown that the state of Colorado builds, owns and controls large reservoirs, which impound vast quantities of water which otherwise would go to make the normal flow of the Arkansas river. It is further alleged, and now proved, that the state of Colorado has chartered, organized and licensed the different corporate defendants herein joined, and that each and all of them are citizens of the state of Colorado, and that it expressly authorizes and permits them to take the full flow of the waters of the Arkansas river during the growing season of each year, and that their demands for water are even then not supplied. The evidence fully shows that the facts do not warrant the filing of a motion on behalf of the corporate defendants, which is found on page 231 of the record, and that motion should therefore be overruled. The evidence introduced now conclusively shows that the state of Colorado itself, by virtue of its laws and its system, through its state officers, its state engineer, the division engineer of division No. 2, and the several water commissioners within that division, itself directly diverts the water from the Arkansas river; that the state itself, through these officers, controls the water and delivers it as these officers see fit to the different defendants and others for use, creating the injuries complained of, and which we charge to be unlawful under any view of the law. The state of Colorado not only creates agencies, by way of corporate charters, to do the unlawful acts complained of, but itself, through its own officers and instrumentalities, performs

the acts complained of, and authorizes, directs and controls the unlawful diversion, and is itself the chief defendant, the greatest offender, and the party against whom, first of all, the injunction should run and operate. It was further alleged, and has now been proved, that the acts charged on the part of Colorado and its citizens were all committed subsequent to the times when the prior rights of the complainant and those for whom it sues had become fixed and vested, protected by the law of the land, so that they can be no more impaired by an adjoining state than by any trespassing individual. This case, therefore, presents under the constitution a competent plaintiff, the very defendants named in the constitution itself, and a justiciable cause of action; and of all these the court has jurisdiction.

SEC. 26. The Common Law in Kansas.

The common law, including the doctrine of riparian rights as therein formulated, embraced the whole territory involved in this controversy down to August 1, 1876, when Colorado became a state. Many of the rights herein claimed became vested in the complainant and in those for whom it sues before that date, and all the rights claimed were prior and vested before the injuries complained of, and all ripened into a rule of property, and could not be changed or divested by subsequent customs or enactments in Colorado without the consent of the vested owners of those rights.

In considering the application of the common law to the territory embraced in this controversy, we cannot do better than to cite the case of Clark v. Allaman, decided by the supreme court of the state of Kansas in April, 1905, 80 Pac. 571. The question of the adoption, the extent, the nature and the limitations of the common-law doctrine of riparian rights was there in issue. The

case was fully argued, and the opinion of the court, rendered by Mr. Justice Burch, is of great importance, and will be of great assistance in the decision of the case at bar. In this decision of the supreme court of Kansas the march of the common law is recited, its sources are given, its authority is established, and its extent and its limitations are marked out. We quote from that opinion as follows:

"The territory from which the state of Kansas was formed was derived from sources which were strange to the common law. All that portion of it lying north of the southern bank of the Arkansas river and east of the 100th meridian was a part of the Louisiana purchase made from France in 1803. The remainder belonged originally to Mexico, and was obtained through the annexation of Texas in 1850. By an act of Congress of March 26, 1804, the region newly acquired from France was divided by a line running west from the Mississippi river at the present southern boundary of Arkansas. The southern part was organized as the territory of Orleans, with a government not quite of the same type as that formulated by the ordinance of 1787, but still a fair territorial government. In the northern portion, which was called, not the territory, but the district, of Louisiana, no regularly organized territorial government was established, but the executive power of the governor of the territory of Indiana was extended over it, and the governor and judges of the territory of Indiana were authorized to establish inferior courts, to prescribe the jurisdiction of such courts, and to make all laws which they might deem to be conducive to the welfare of the inhabitants of the district. (2 Stat. 283, c. 38.) The inhabitants of the district of Louisiana remonstrated against this sort of government, and petitioned for officers and a government of their own according to the principles of the ordinance of 1787. (Annals of Cong. [8th Cong., 2d sess.] pp. 1608, 1619.) Congress acceded to this request, and by the act of March 3, 1805, gave to the district a government of its own, and changed the name to

the 'Louisana Territory.' Legislative authority was invested in a governor and three judges. (2 U. S. Stat. 331, c. 31.) By an act of Congress of June 4, 1812, the name of the territory of Louisiana was changed to 'Missouri Territory,' without any alteration of boundaries, and the French portion of the state of Kansas came under the jurisdiction of its legislature, composed of a governor, a legislative council, and a house of representatives. (2 U. S. Stat. 743, c. 95.) Up to that time the various legislative authorities of the region under consideration, including the Congress of the United States, had promulgated general laws and particular acts recognizing, founded upon and putting in force the common law to such an extent as to amount to its practical establishment as the common law of the territory. But on January 19, 1816, the legislature of the territory of Missouri enacted the following statute: 'A law declaring what laws shall be enforced in this territory. Be it enacted,' etc. '(1) The common law of England, which is of a general nature, and all statutes made by the British parliament in aid of or to supply the defects of the said common law, made prior to the fourth year of James the First, and of a general nature and not local to that kingdom, which said common law and statutes are not contrary to the laws of this territory, and not repugnant to or inconsistent with the constitution and laws of the United States, shall be the rule of decision in this territory until altered or repealed by the legislature, any law, usage or custom to the contrary notwithstanding.' (1 Terr. Laws, p. 436, c. 154.) The state of Missouri was carved out of the territory of Missouri and admitted into the Union in 1821, and that part of the territory of Missouri subsequently included within the limits of the state of Kansas was left unorganized and outside of any local jurisdiction. (Windsor, Nar. and Crit. Hist., 550, note 3.) By an act of June 30, 1834, Congress ordained that all that part of the United States west of the Mississippi, and not within the states of Missouri and Louisiana and the territory of Arkansas (organized in 1819), should be taken, for the purposes of the act, to be Indian country, and certain regulations were prescribed for its government.

It was not intended that the Indian country should be open to settlement by white men. Their relations with the Indians were regulated, the laws of the United States relating to the punishment of crime were declared to be in force except as to crimes committed by one Indian against the person or property of another Indian, and for the purpose of carrying the act into effect the northern portion of the Indian country was annexed to the state of Missouri for judicial purposes, while the southern part was attached to the territory of Arkansas. (4 U. S. Stat. 729, c. 161.) But aside from these limited subjects the purpose was that the only local laws and governments that were to obtain were to be the laws and governments of the Indians themselves, and Indian treaties were framed upon this express basis. 'The laws of the territory of Missouri had no force or effect in the Indian country after that country had ceased to be a part of such territory.' (St. Louis etc. Railway Co. v. O'Loughlin, 4 U. S. App. [eighth circuit] 283, 287, 49 Fed. 440, 1 C. C. A. 311.) This status of affairs in the Louisiana portion of the state continued until the organization of the territory of Kansas. After the independence of Texas from Mexico had been declared, the following provision was inserted in the constitution for the new republic, adopted on March 17, 1836: 'The congress shall, as early as practicable, introduce by statute the common law of England, with such modifications as our circumstances in their judgment may require; and in all criminal cases the common law shall be the rule of decision.' (2 C. & C. 1757.) Pursuant to this injunction, the congress of Texas, on January 29, 1840, passed an act in the following terms: 'Be it enacted,' etc., 'That the common law of England, so far as it is not inconsistent with the constitution or the acts of congress now in force, shall, together with such acts, be the rule of decision in this republic, and shall continue in full force until altered or repealed by congress.' (1 Sayles, art. 707.) In the case of Sparks v. Spence, 40 Tex. 693, 701, this law is said to have taken effect from and after March 16, 1840. It remained in force at the time Texas became a part of the

United States, and had not been abrogated at the time the Kansas-Nebraska bill was signed by President Pierce, on May 30, 1854. On the date last mentioned Kansas became a territory, with boundaries including all of the present state and a considerable portion of the present state of Colorado besides. Immediately upon the organization of the territory of Kansas, the composition of its law received attention. In his message of July 2, 1855, to the first territorial legislature, Governor Reeder said: 'It appears that the laws of the United States not inapplicable to our locality, the laws of the territory of Indiana made between the 26th of March, 1804, and the 3d day of March, 1805, enacted for the district of Louisiana, the laws of the territory of Louisiana, the laws of the territory of Missouri, the common law, and the law of the province of Louisiana at the time of the cession, except so far as the latter have superseded the former, still remain in force in the territory of Kansas. As the common law, to a considerable extent, was adopted for the territory by Congress as late as 1812, and by the Missouri legislature as late as 1816, . . . it has without doubt suspended and modified a great amount of the law previously existing.' At that session the following statute, which took effect November 1, 1855, was passed:

'An act adopting the common law as the rule of action in this territory.

'*Be it enacted by the Governor and Legislative Assembly of the Territory of Kansas, as follows:*

'SECTION 1. The common law of England and all statutes and acts of parliament made prior to the fourth year of James the First, and which are of a general nature, not local to that kingdom, and not repugnant to or inconsistent with the constitution of the United States and the act entitled "An act to organize the territory of Nebraska and Kansas," or any statute law which may from time to time be made or passed by this or any subsequent legislative assembly of the territory of Kansas, shall be the rule of action and decision in this territory, any law, custom or usage to the contrary notwithstanding.

'SEC 2. Punishment by virtue of the common law shall in nowise be other than fine and imprisonment, and such fine shall not exceed one hundred dollars, and such imprisonment shall not exceed six months; nor shall any of the British statutes for the punishment of crimes and misdemeanors be in force in this territory.' (Laws 1855, p. 469, c. 96.)

"At the legislative session of 1859 this statute was reenacted in identical terms, and continued in force until superseded by state legislation.

"The state of Kansas, with its present boundaries, was admitted into the Union on January 29, 1861. The first state legislature met in 1862, and the territorial law of 1855 and 1859, adopting the common law as the rule of action and decision, any law, custom or usage to the contrary notwithstanding, was reenacted *verbatim*. This statute (Comp. Laws 1862, p. 678) remained in force until October 31, 1868. The present law then became operative, and reads as follows: 'The common law as modified by constitutional and statutory law, judicial decisions, and the conditions and wants of the people, shall remain in force in aid of the general statutes in this state; but the rule of the common law, that statutes in derogation thereof shall be strictly construed, shall not be applicable to any general statutes of this state, and all such statutes shall be liberally construed to promote their object.' (Gen. Stat. 1901, sec. 8014.)

"From this sketch it will be observed that the authority of the common law was prevalent throughout the confines of the state under every civilized form of governmental organization, from the earliest times until the autumn of 1868, and all other systems were finally supplanted and obliterated, and could not be appealed to as measures of right. Such constant adherence to its principles could not have been occasioned by accident or indifference, but must have been the natural result of a deep-seated conviction of its complete efficiency as a means of justice. A closer examination of the circumstances of its adoption justifies this conclusion. The few sparse settlements existing before the establishing of the Indian country may be passed over, and attention be directed to the more active efforts at state-making, beginning near the time of the passage of the Kansas-Nebraska bill. For some months previous to the enactment of that law the government at Washington had been busy negotiating treaties with various Indian tribes, whereby the soil of Kansas lying west of Missouri was opened to settlement.

The great excitement in different sections of the country over the question of slavery in the new territory, the foundation of emigrant aid societies, the sudden influx of a heterogeneous population, and the resulting political conflicts, are matters of common knowledge. But throughout it all there is no trace of any disagreement of the people concerning the adequacy of the common law to meet all the requirements of their societary relations to their new environment. On the part of the South, the states of Missouri, Alabama, South Carolina and Georgia took the lead in colonization. (The Buford Expedition to Kansas, 6 Am Hist. Rev. 38.) Upon its organization as a state the legislature of Missouri placed upon its statute-book an adoption of the common law in terms similar to those of the territorial enactment. The effect of this statute upon the question of water rights is indicated by the following quotations from the later decisions of its supreme court: 'Unless authorized by lawful authority, no one can interfere to any material extent with the waters of a running stream. . . . The statute of this state (sec. 3117, p. 521, Rev. Stat. 1879) declares that "the common law of England . . . shall be the rule of action and decision in this state, any law, custom or usage to the contrary notwithstanding." This statutory obligation and duty has been recognized and enforced, as we have seen, in all the earlier and later adjudications of this court on this subject.' (Abbot v. K. C. St. J. & C. B. Rly. Co., 83 Mo. 271, 285, 53 Am. Rep. 581.) 'The plaintiff was the possessor of certain riparian rights. These rights were property. Of that property he could not be deprived without just compensation, nor could the state itself either exercise such a power of deprivation, or confer it upon some subordinate municipality, dissevered from the constitutional condition of compensation for the property taken. . . . On this point I entirely concur with Judge Bakewell, of the court of appeals, where he says: "When it is settled that riparian rights are property—and of this there seems to be no doubt—the question as to the right to take them without compensation is at an end." Meyers v. City of St. Louis, 8 Mo. App. 266.' (Myers v. The City of Louis, 82 Mo. 367, 375, 378.)

"Immigrants from the other Southern states named were inured to the principles of the common law. (8 Cyc. 387.) It was likewise notoriously the heritage of the men who came from the North to Kansas to aid in establishing its law. There is something of an analogy between the peopling of the territory of Kansas and the peopling of the territory of Oklahoma, so far as the question under consideration is concerned, and the result in the latter instance is described in a recent decision of the supreme court of Oklahoma, as follows: 'When people from all parts of the United States, on the 22d day of April, 1889, settled the country known as "Oklahoma," built cities, town, and villages, and began to carry on trade and commerce in all its various branches, they brought into Oklahoma with them the established principles and rules of the common law, as recognized and promulgated by the American courts, and as it existed when imported into this country by our early settlers, and modified by American or English statutes.' (McKennon v. Winn, 1 Okla. 327, 33 Pac. 582, 22 L. R. A. 501.) Included in this system were rules respecting rights to use the water of running streams.

"The opening sentence of the second chapter of the 'Conquest of Kansas,' written by the late Wm. A. Phillips in 1856, is as follows: 'The cabins of squatters had begun to dot the face of the country, and the music of the pioneer's ax was ringing amongst the timber that shaded the watercourses of Kansas.' The tide of immigration followed the lines of the watercourses. Along their banks the first land titles were acquired, the first homes founded, the first cities built, the first industries established. Therefore, the common law relating to riparian rights was not a mere matter of academic interest or learned study, as a survival from medieval times to those who established the foundations of the state's greatness, but it was the law of reason and of justice, responding to the actual demand of the times and to the circumstances and needs of the people.

"It is true that in Kansas, as in California and Colorado, codes of 'squatter laws' were adopted, but in origin and purpose they bore no resemblance to those of the West already described. At first considerable uncertainty

existed with reference to the proper interpretation to be given to the laws of the United States relating to the acquisition of land in the new territory. (See opinion of Caleb Cushing, attorney-general, to secretary of interior, August 12, 1854, 6 Opinions Atty.-gen. 658.) Because of this uncertainty, and because of the practice then becoming common of making fictitious settlements for political purposes only, various codes of the character named were adopted. A number of these were merged into the 'Rules and Regulations for Settlers,' agreed upon at a meeting of the 'Actual Settlers' Association of Kansas Territory' on August 12, 1854, at Millersburg. The preamble and article 14 of these rules are as follows:

'Whereas, The laws of the United States confer upon citizens the privilege of settling and holding lands by preemption right; and whereas, the Kansas valley, in part, is now open for location of such claims; and whereas, we, the people of this convention, have and are about to select homes in this valley, and in order to protect the public good and to secure equal justice to all, we solemnly agree and bind ourselves to be governed by the following ordinances: . . .

'XIV. The limits of this association shall be the waters of the Wakarusa and Kansas rivers, and the territory between the same, from the mouth of the Wakarusa to the Shawnee purchase.'

"From this it is apparent that the Kansas code, of necessity, merely undertook to protect the lawful efforts of men and women who in good faith were actually endeavoring to secure homes in the vicinity of the streams, and in nowise sought to supplant the law of the land; and the customs of the people adopting them were not antagonistic to the rules of the common law, as were those of the settlers of the mountain states. Home builders in Kansas did not need to divert the courses of the streams upon whose banks they settled, and they did not do so. Irrigation was not necessary for agriculture, manufacturing, mining, or any other industrial purpose. Soil, climate and the natural topography of the country forbade its successful use; and it was not until the state had become filled with a population accustomed to rely upon the common law as the measure of their rights that the subject began to attract attention. At that time the lines of the state's development

had become fixed, its legal system had become settled, and, under the various territorial and state statutes already quoted, making the common law the rule of conduct and decision, any custom or usage to the contrary notwithstanding, usages and customs of the character of those exhibited by the early occupants of land in the arid state were actually prohibited, at least until within two years of the construction of the Comstock dam and ditch.

"Under these circumstances, there is no room for debating either the existence of the justice of the common-law rules relating to the rights of the riparian landowners in the state. The legislature has recognized them—as, for example, in the mill-dam act of 1867 (Laws 1867, p. 159, c. 87), providing for the assessment and payment of damages to the owners of land, both 'above and below' the projected dam, occasioned by 'overflowing or otherwise,' which includes diversion, and this court has alway recognized them. 'Every man through whose land a stream of water runs is entitled to the flow of that stream without diminution or alteration. The Council Grove Peerless Mill Company, in 1874, with the assent of an upper riparian owner, dug a channel through the lands of such owner from a point on the Neosho river to its mill, and thereby diverted from its natural channel through the land now belonging to plaintiff in error a portion of said stream, and this without the assent of the then owner of said plaintiff in error's land. *Held*, that thereby the mill company acquired no right to continue said diversion, or to restrain the plaintiff in error from removing any obstruction, natural or artificial, in the bed of said river on his lands. . . . The right to the use of the flow of water in its natural course is connected with and inherent in the property in the land, and passes by a conveyance of the land.' (Shamleffer v. Peerless Mill Company, 18 Kan. 24 [Syllabus].) 'Now, that the flow of the water in the natural channel of a surface stream is a property right of the riparian owner is unquestionable and familiar law. (Shamleffer v. Mill Co., 18 Kan. 24.) If an individual should, by digging a new channel a few hundred feet above Soden's dam, attempt to divert the

flow of the stream, beyond doubt he would be restrained. And this restraint would be granted not because of the mere fact of digging a channel, but because thereby the natural flow of the stream was prevented—not because of the manner, but because of the fact, of the diversion. The restraint would be granted as readily if the abstraction was by pipes and pumps as if by channel and a change of current. The principle is this: That whatever of benefit, whether of power or otherwise, comes from the flow of water in the channel of a natural stream, is a matter of property, and belongs to the riparian owner, and is protected in law just as fully as the land which he owns. It cannot be taken for private use, except by his consent, and for public use only upon due compensation.' (City of Emporia v. Soden, 25 Kan. 588, 604, 37 Am. Rep. 265.) 'It must be conceded that the defendant in error has undoubted right to the use and enjoyment of the flow of the water in a natural watercourse that runs through his land. This right is an immemorial one, and is protected by all courts.' (A. T. & S. F. Rly. Co. v. Long, 46 Kan. 701, 702, 27 Pac. 182, 183, 26 Am. St. Rep. 165.) 'An owner of land has a right to change the channel and divert the water in a stream flowing through his land, providing that he returns the water to the original channel before it reaches the land of the proprietor below.' (Mo. Pac. Rly. Co. v. Keys, 55 Kan. 205, 40 Pac. 275, 49 Am. St. Rep. 249.) 'The plaintiffs in error had a right to confine the waters of the creek to the channel, and, to accomplish that, were entitled to build cribs or barriers along the south bank of the creek in order to protect their property from the overflow and waste. This must be done, however, in such a way as not to interfere with the rights of others. They cannot build and maintain structures which will change the channel of the stream, or project the water against and upon the property of another in such a way as will result in substantial injury to either an owner upon the opposite side of the stream, or those above or below.' (Parker v. City of Atchison, 58 Kan. 29, 48 Pac. 631, 634.)''

Upon the question of riparian rights and the right of appropriation of water for irrigation purposes, the states of the Union divide themselves into three distinct classes, and in each class there is a system of laws suited to the conditions and wants of the people:

First. Those states where the practice of irrigation does not prevail, and where the rule of the common law is in full force.

To this class belong the Eastern, Southern, Middle and some of the Western states.

Second. Those states where, from their natural and physical conditions, there are no valleys of river-saturated lands, and where there is no foundation for extensive riparian rights, but where different conditions created a new and antagonistic rule of law known as the right of prior appropriation.

To this class belong the states of Colorado, Wyoming, Utah, Nevada, Idaho, and perhaps Montana.

Third. Those states which embrace the characteristics and conditions of both the foregoing classes; one part of which is humid and another part arid; one part of whose soil is naturally fertile and another part unproductive without irrigation; one part of whose territory is adapted to riparian rights and the other adapted to the rights of appropriation, and where two different systems are needed for their full development.

To this class belong California, Oregon, Washington, North and South Dakota, Nebraska, Kansas, and Texas.

Within the states of the first class the legal principles involved in determining water rights are simple and consistent, and the judicial decisions are easily harmonized. They follow common-law rules, and but few new questions are now presented.

The states belonging to the second class have constitutional provisions authorizing the appropriation of

water for irrigation purposes. Section 6 of article 16 of the constitution of Colorado reads: "The right to divert unappropriated waters of any natural stream for beneficial uses shall never be denied." Following this and similar constitutional provisions, the judicial decisions in these arid and mountainous states uphold the doctrine of prior appropriation, and the rule of the common law as to riparian rights is not recognized and is practically abrogated.

The only real difficulty has arisen within the states belonging to the third class. Yet in these states, although grave difficulties were at first confronted, the decisions are consistent and logical, and may be harmonized with each other. An examination of the leading cases of each of these states will show the unity of view entertained:

Lux v. Haggin, 69 Cal. 255, 10 Pac. 674.

Gould v. Eaton, 117 id. 539, 49 Pac. 577.

Benton v. Johncox, 17 Wash. 277, 49 Pac. 495.

Low v. Schaffer, 24 Ore. 239, 33 Pac. 678.

Lone Tree Co. v. Cyclone Co., 15 S. Dak. 519, 91 N. W. 352.

Crawford Co. v. Hathaway, 93 N. W. (Neb.) 781.

Irrigation Co. v. Hudson, 85 Tex. 587, 22 S. W. 398.

Shamleffer v. Mill Co., 18 Kan. 24.

Wood v. Fowler, 26 id. 682.

Koen v. Klein, 63 id. 484.

Sturr v. Beck, 133 U. S. 541.

It is thus seen that, if not from a time so remote that the memory of man runneth not to the contrary, yet from the first moment when the soil of Kansas came under the jurisdiction of the United States, it became impressed and reimpressed with the doctrine and rules of the common law.

The rule of the common law as to riparian rights is

stated by Chancellor KENT as follows, and this statement is sufficient for the present discussion:

"Every proprietor of lands on the banks of a river has naturally an equal right to the use of the water which flows in the stream adjacent to his lands as it was wont to run (*currere solebat*) without diminution or alteration. No proprietor has the right to use the water to the prejudice of other proprietors, above or below him, unless he has a prior right to divert, or a title to some exclusive enjoyment. He has no property in the water itself, but a simple usufruct while it passes along. *Aqua curret et debet currere* is the language of the law. Though he may use the water while it runs over his land, he cannot unreasonably detain it or give it another direction, and he must return it to its ordinary channel when it leaves his estate." (3 Kent, 439.)

"'Fresh rivers of whatsoever kind do of common right belong to the owners of the soil adjacent' is the expressive language of the common law and is of universal application." (Smith v. City of Rochester, 92 N. Y. 473.)

The court will take judicial notice of the settlement and development of Kansas; and that prior to 1868 its territory had become occupied, its lands had been established, and its institutions had become fixed. These things every one must know. It must be also admitted that prior to 1868 the rule of the common law as to riparian rights in Kansas prevailed in all its vigor, and without any qualification whatever.

It is thus seen that Kansas is a common-law state so far as the doctrine of riparian rights is concerned, but, like the states of California, Oregon, Washington, North and South Dakota, Nebraska, and Texas, that Kansas has adopted a rule that will allow the largest development of its territory consistent with the rights of all its citizens. As to how far Kansas may see fit to modify the most extreme form of the rule of riparian rights is not before the court, and this does not affect the

rights of Kansas as alleged and proved in this case, nor does it affect the wrongs committed by the state of Colorado and its codefendants, as shown in the evidence. In the case of Clark v. Allaman the court further says:

"In 3 Farnham on Waters, 1903, it is said: 'All conceptions of riparian land lead to the conclusion that it is land which is tributary to and lying along a watercourse, and as soon as the "divide" is passed and the watershed of another stream is reached, the land cannot be regarded as riparian with reference to the former stream; and since the right to irrigate depends upon the land being riparian, the destruction of the riparian character destroys the right to irrigate.' Within these limits the principles of equality of right, announced above, should control the use of water for irrigation purposes by those whose land is affected by the presence of the stream, irrespective of the accidental matter of governmental subdivisions of the land. 'It would seem, therefore, that any person owning land which abuts upon or through which a natural stream of water flows is a riparian proprietor, entitled to the rights of such, without regard to the extent of his land, or from whom or when he acquired his title. The fact that he may have procured the particular tract washed by the stream at one time, and subsequently purchased lands adjoining it, will not make him any the less a riparian proprietor, nor should it alone be a valid objection to his using the water on the land last acquired. The only thing necessary to entitle him to the right of a riparian proprietor is to show that the body of land owned by him borders upon a stream. This being established, the law gives to him certain rights of the water, the extent of which is limited and controlled less by the area of his land than by the volume of water and the effect of its uses upon the rights of the other riparian proprietors. By virtue of the ownership he is entitled to a reasonable use of the water, which is defined as 'any use that does not work actual, material and substantial damage to the common right which each proprietor has, as limited and qualified by the precisely equal right of

every other proprietor.''' (Jones v. Conn, 39 Ore. 30, 64 Pac. 855, 54 L. R. A. 630, 634, 87 Am. St. Rep. 634.)

The facts as shown in the evidence come within the rule laid down in the cases just quoted. Riparian ownership does not depend upon geographical lines, nor political subdivisions of land. Riparian lands, according to these authorities, are such as are directly affected by the presence of the river. Every rood of land in the Arkansas valley extending back to the uplands on either side is thus affected by the existence, the presence and the condition of the Arkansas river. The level of the underflow corresponds with the level of the water in the river back to the uplands, and, according to this rule here enunciated, every acre of land in the Arkansas valley is riparian land, bought, sold, cultivated and its value fixed according to the volume of water in the river, and every principle of common law makes these lands riparian to the Arkansas river, and their owners riparian proprietors. The state of Kansas insists upon the preservation of the doctrine of riparian rights within its own territory, but the state of Kansas does not insist that the doctrine of riparian rights shall be extended over the territory of any arid state where its presence would not be suitable, and where its existence has been abrogated by the constitution, the laws, and judicial decisions. We do not urge that the court should decide in this case that the common-law rule of riparian rights should be held to be in force in the territory of Colorado; we simply urge that, as the injuries complained of have been inflicted within the territory of the state of Kansas, those injuries should be judged by the laws of Kansas, and the remedy should be applied according to the laws of this jurisdiction, and not by the laws of the adjoining state, which has become the aggressor and has wrought the damages complained of.

The defendants do not appear in this case, either in

their answers or in the evidence adduced by them, as riparian owners along the Arkansas river, having full riparian rights and demanding a reasonable and equal amount of these waters under the common-law doctrine. They appear with a different system, under different laws, upon a different basis, using the water for a different purpose, all subsequent to the prior rights of the state of Kansas and its citizens, demanding the right to take the whole of the flow of the river and actually appropriating and using it all. The evidence shows that all the land along the Arkansas river in the state of Colorado in its natural condition is dry, arid, non-saturated land, sparsely covered with sage-brush and cactus, down to the very banks of the river. These lands were wholly unaffected by the presence or flow of the river, and could be called riparian in nothing but a geographical sense. The waters of the Arkansas river were never a part or parcel of these arid lands in Colorado, for the waters of the river never affected them, and the other riparian rights have not been plead or claimed by the defendants. These defendants have plead a new, distinct and antagonistic system, taking the water out and away from the river and putting it upon dry and arid lands, many miles from the river itself, and on land that never felt the effects of the river before, and on lands of which the waters of the river were never part nor parcel, and all this was done subsequent to the vesting of the prior rights in the state of Kansas and its citizens, and resulting in the injuries hereinbefore enumerated. Thus, the common-law rights of Kansas and its citizens have been invaded by a subsequent and different system, framed upon a different theory, and built upon a different basis, and in a different state. These defendants now have the temerity to claim that they should be protected in their different and subsequent systems because they live and operate on the other side of the state line.

SEC. 27. The Arkansas River—Currere Solebat.

The right of the complainant and those for whom it sues is a right to the usual and normal flow of the river "as it was accustomed to run" during ordinary years prior to the unlawful diversion complained of, and exclusive of floods and unusual high waters.

The right of a riparian owner to the flow of the stream "as it is accustomed to run" in our judgment does not include extraordinary high waters, or floods, or times of unusual drought and low water. The words "as it is accustomed to run" mean in our judgment the normal or usual flow of the river from year to year. In the case of the Arkansas river this is not at all difficult to define. Let us illustrate. Before the unlawful diversion by Colorado there was always a season of high water in June, known as the June rise, caused by the melting snows in the mountains and foot-hills of Colorado, which gradually swelled the current until it was about bank full, at which stage it ran from four to six weeks, from whence it gradually subsided to its normal summer flow. This June rise was as regular as the recurrence of the seasons, not only in time but in volume. It was a part, in short, of the normal flow of the river, as distinguished from the extraordinary floods caused by unusual rainfall either in the mountains or uplands of Colorado or along the tributaries of the river in that state. Our contention is that the June rise was part of the normal flow of the river to which the riparian owners in Kansas were entitled. It fulfilled a great purpose in the economy of the Arkansas valley in Kansas, filling the river from bank to bank, raising the water-level to a point where the pressure of the water was sufficient to bear in every direction. It filled the great underground stream, which we term the "underflow"; completely saturated the valley lands and affected the great system of sub-irrigation upon which the prosperity of the valley, the value of

its lands and its recurrent crops of cereals, vegetables and fruit depended. From the very moment that this June rise began to disappear by reason of the canals built by the defendants the underflow began to subside; the bed of the river began to narrow and become more shallow; islands formed in it; sub-irrigation diminished until it was practically destroyed; crops diminished; the orchards languished; irrigation ditches no longer had water in them; and all of the institutions and prosperity, that were not only dependent upon the summer flow, but upon this June rise, languished as a result of its disappearance; so we count this June rise as a part of the normal flow of the river. Floods might come at any time by virtue of unusual rains, but the June rise appeared as regularly as the sun approached the summer solstice. It was looked forward to because it contributed to the prosperity of the valley and tended to maintain throughout the summer months the two great sources of the valley's prosperity, the surface river and the underflow. As we understand the words "as it is accustomed to run," they mean the flow of the river as it is accustomed to run from year's end to year's end—not in any one week, or any one month, or any one season of the year—because every river rises and falls with the recurrence of different seasons. It is usually highest at times of melting snows; its flow diminishes through the parching heat of August; in the autumn it begins to increase until the rigors of winter check its flow; it then remains stationary until the melting snows again begin to swell its volume. This is true of the Arkansas river, as of almost every other river, and the accustomed flow, the normal flow, the usual flow, as these terms are used, are applied to its yearly flow in the general course of the stream from one year's end to another throughout the entire course of the seasons. This normal or usual flow,

from season to season, is that upon the faith of which the purchaser of riparian lands buys. If he buys at a period of excessive drought he is informed of that fact; if he buys at a time of extraordinary high water he is informed of that fact; if he bought during the June rise he would buy with knowledge of the fact that this occurred from year to year, could be relied and depended upon to fill the underflow, saturate his valley lands, supply water for the irrigation ditches, and nourish his crops, as certainly as he could rely upon the recurrence of the seasons. He aqcuired by virtue of his purchase of valley lands a vested right in all the usual flow of the river, including this June rise, which was of inestimable value, and without which his lands would speedily become desolate and incapable of production. It is upon this ground that we base our claims that the settler who settled upon the lands in the Arkansas valley, and the purchaser who bought those lands, who built up the municipalities along the river, all did so upon the presumption that the Arkansas river would continue to flow as it was accustomed to flow; that its underflow would be filled, its bottom lands saturated, its irrigation ditches supplied with water, as they had been supplied in the past. They paid more highly for the valley lands for that reason. A railroad was constructed along the valley for that reason, and it is worthy of note that this, the Santa Fe railroad, the first built through Kansas without government aid, struck directly for the Arkansas river, and followed it from Hutchinson to Pueblo, because of this very fact that the flow of the Arkansas river permitted profitable agriculture, and the foundation and maintenance of larger municipalities than any of the uplands of Kansas could show. The railroad was built; the lands were settled; towns and cities sprang up; schoolhouses and churches were established; and all the elements of a prosperous civiliza-

tion were gathered and welded together, simply because of the fact that the Arkansas river, from year to year affording a steady stream and an annual rise in June, supplied the elements necessary to profitable agriculture and the maintenance of this great civilization, which grew up along its banks years before the uplands back from the river were thought of as agricultural opportunities.

We admit that what is known as flood waters, stages of the river produced by excessive and irregular precipitation, whose recurrence cannot be foreseen or controlled, do not come within the definition of the flow of the river as it is accustomed to run. Such waters as these constitute a natural enemy, affording no benefit to the riparian owner, but rather an element of danger. As to these waters we assert no claim. We believe that if it is possible to do so, and the facts clearly show that it is, these flood waters should be segregated and conserved in reservoirs along the banks of the streams, under the reclamation act, to be distributed by the federal government in such a manner as is best calculated to increase the prosperity of the valley. Kansas makes no claim to them, except in so far as she may have some subsequent right under the reclamation act, when that act shall have spent its force upon these destructive waters.

The complainant and the defendants do not stand in this court with equal rights in the waters of the Arkansas river "as they were accustomed to flow." Kansas is prior; Colorado is subsequent. The defendants do not claim merely an equal right to the flow of the river "as it used to run." Colorado claims a monopoly in the flow of the river, the sole ownership of it and right to it, to the exclusion of every common-law riparian owner in the lower states. Upon this monstrous claim Colorado has built up a new, different and antagonistic system, upon which all their claims are founded. With

that system itself Kansas has no fault to find, and only complains when that later system interferes with and impairs prior vested rights. The reclamation act is founded upon the recognition of these prior vested rights, and can be upheld upon no other theory. When these prior vested rights in the lower states are recognized and protected then the reclamation act can work out its full beneficent results, and a conservation of the unusual, flood and surplus waters will supply every ditch in Colorado along the Arkansas river with a more ample and certain amount than they have ever had in the years that are past. The recognition of the rights herein claimed is necessary to the success of the reclamation act, and to that equality of opportunity and share in the physical treasures of our common land which are implied and recognized from the foundation of this government. Under this claim of monopoly Colorado has invaded the rights and prosperity of Kansas, destroying great industries that had been built up here with care and toil before Colorado ever made beneficial use of any of these waters. In ages past the thriftless Highlander of Scotland descended upon the estate of the Lowlander, and, sweeping together in a single raid the accumulations of years of thrift, retreated with them to his mountain fastness, defying the law and repelling all attempts at retaliation. But this lawlessness of a past age took from the industrious Lowlander only the increment of his labors and the increase of his toil. Colorado, from her highlands, has descended upon the prosperous lowlands of Kansas, and by her system has not only taken the increment and increase of our toil, but destroyed the very source of our prosperity. The ancient Highlander made his raid under the claim of might; Colorado has raided our industries and prosperity under a claim of right, and we appeal to this court to decide that claim, which in our view is as law-

less and has as little foundation under the laws of this country as the claim of the Highlander of Scotland.

Growing out of the exclusive and monopolistic claim of Colorado to the flow of the river is the use of its water as merchandise. The testimony conclusively shows that the great irrigation companies, defendants herein, have taken and are taking the water which belongs to Kansas, conveying it by immense canals to great distances from the river, and selling it as an article of merchandise for use upon lands wholly upland and non-riparian in character. Even though it were considered that a limited amount and a reasonable use of water for irrigation is recognized by the common law, that use is strictly limited to riparian lands and to a reasonable use. This identical question has been passed upon by the supreme court of California, one of the arid states. In the case of Heilbron v. Canal Co., 75 Cal. 426, it was held that a riparian proprietor could not, as against a lower proprietor, authorize a corporation to take water from the stream, to be conducted to a distance and there sold. We invite the court's consideration to the discussion in the opinion, which is too lengthy to be here quoted. As already pointed out, the courts of Colorado have distinctly held such waters as the underflow of the Arkansas river in Kansas to be part and parcel of the surface stream itself and not percolating waters; but even though the underflow is to be held as merely percolating water, the right of the Kansas proprietor to such water, undiminished except by reasonable use, is clear and plain. The question of the deprivation of percolating waters by wells and pumps on adjoining lands has been exhaustively considered in recent years. It has been thoroughly settled that an adjoining landowner may not drain percolating water from the lands of his neighbors, make merchandise of the water, and

sell it, and that equity will enjoin such drainage of adjoining lands. One of the leading cases upon this point is Katz v. Walkinshaw, 70 Pac. 663, a California case. In that case the defendants contended that they had a right, by powerful pumps, to draw the percolating water to the surface and sell it, without regard to the effect upon adjoining lands. The supreme court of California rejects this doctrine, and, after an exhaustive consideration of all the authorities, establishes the doctrine of reasonable use upon the lands along and beneath which the water is found; that is to say, the owner of the land might pump the water to the surface for use upon his own land in a reasonable way, but he may not do this unreasonably nor make merchandise of it, where such use exhausts the water from neighboring lands. A very similar and recent case is the case of Smith v. City of Brooklyn, 46 N. Y. Supp. 141. There the operation of a system of water-works by the city of Brooklyn, in draining percolating waters on the plaintiff's land, destroyed the flow of a brook thereon, and the court granted an injunction against such action. In the case of Forbell v. City of New York, 164 N. Y. 522, the plaintiff claimed damage by similar water-works, in that it lowered the saturation of his land, and the court sustained his claim. The case of Katz v. Walkinshaw came up for rehearing, and the decision will be found in 74 Pac. 766. At that time a large number of briefs were filed, *amici curiæ*, and the whole question, including the decision of Justice Temple in the original case, was exhaustively argued. The court denied the rehearing and affirmed its original doctrine, and in considering the difficulties in the way used the following language, apt and pertinent to the case at bar:

"It is clear, also, that the difficulties arising from the scarcity of water in this country are by no means ended, but, on the contrary, are probably just beginning. The

application of the rule contended for by the defendants (that is, the absolute ownership of the right to make merchandise of it) will tend to aggravate these difficulties rather than solve them."

The defendants' contention was that the difficulties in the way and interfering with such use by the courts were insurmountable, but, however clear the right, the court would not enforce it because of these difficulties.

The court says:

"The difficulties to be encountered must be insurmountable to justify the adoption or continuance of a rule which brings about such consequences."

Practically all the decisions bearing upon this question of percolating waters are to be found cited in these two cases. Their application and persuasiveness in the case at bar seem to us clear. The underground water of the underflow in Kansas, whether it be deemed a part of the surface stream, a subterranean stream, or mere percolating waters, has been shown to be of great value to the whole Arkansas valley in Kansas. It belongs to the owner of the soil. He has a vested right in and ownership of it as much as of his land. To cut off the supply that maintains this flow is as serious a damage to him as directly to drain the flow itself. No difference in principle can be distinguished between our case and the case just cited. It matters not whether one is wronged directly or indirectly; whether by deprivation of the flow by adjoining drainage or by destroying the sources of supply at the fountainhead. In fact, the plaintiff's situation in Smith v. City of Brooklyn is almost exactly similar to ours, except that his water was a surface stream. It cut off the supply of that stream just as Colorado has cut off the supply of our underflow. In Forbell v. City of New York, the plaintiff's claim was that the saturation of his land was lowered and its fertility reduced. That is exactly our claim here.

SEC. 28. Riparian Ownership does not Require Use.

The right of a riparian owner on a stream to its flow as it was accustomed to run does not depend upon his use of the water, but special damage caused by diversion furnishes additional ground for relief.

The complainant herein has, at great expense and much expenditure of trouble, proved the value of the waters of the Arkansas river to the riparian owners and to the settlers in the Arkansas valley, including the water power at Arkansas City, the possible navigability of the stream to Wichita, and the use of the water for irrigation in western Kansas. In our view of the law, as we shall demonstrate in this section, such proof was strictly unnecessary. The rights of a riparian owner in common law to the flow of a stream as it was accustomed to run do not depend upon any use he may make of the water. He may use it for drinking, for bathing, for watering his stock, in a limited way for irrigation, in a limited way for manufacturing, providing he does not pollute the stream, but none of these uses are necessary to his right to the flow of the stream. He may compel upper riparian owners to leave the flood go by him unpolluted, unimpaired and undiminished without making any use whatever of it himself. He has a right to stand upon the bank and see the stream flow as it was accustomed to run, if he never dips a foot in it, drinks from it, or makes any beneficial use whatever. It is a vested right that attaches to his land by virtue of his location upon the banks of the stream ; it is therefore wholly different from any possible right which an irrigator acquires in any of the arid states by virtue of beneficial use, and under the doctrine of prior appropriation. This is one of the important distinctions between the common-law riparian rights and the

doctrine of prior appropriation which has grown up in the Western states and territories.

The great purpose of the volume of testimony which we have presented as to the damage done to the valley, not only to the riparian owners who live directly upon the banks of the stream but to all whose lands were formerly saturated by the underflow, to those who were formerly able to use water for irrigation, for water power, and to the municipalities that have grown up throughout the valley, is offered merely as an additional reason why the court should interpose its arm to prevent the continuance of this unlawful diversion.

Colorado complains that if the court grants Kansas relief a great civilization which it has built up in Colorado will be destroyed. We say that a great civilization was built up in Kansas, founded upon the annual flow of this river entirely. Colorado has impaired it throughout the valley in Kansas, and in some places destroyed it. The measure of its prosperity is the measure of our loss. We have endeavored to show the court we made a beneficial use of the flow of this river, built up and maintained a great prosperity founded thereon—a prosperity which was largely diminished when Colorado diverted the flow. We do this without yielding an iota of the principle above contended for, that we have a right to the flow of this river regardless of its benefit to us or the use we make of it.

The authorities upon this point are uniform and we shall cite but a few of the leading cases. One of the earliest was Lux v. Haggin, 69 Cal. 255, one of the greatest and most far-reaching cases ever decided by any court. In the syllabus it is said :

"By the common law the right of the riparian proprietor to the flow of the stream is inseparably annexed to the soil, and passes with it, not as an easement or appurtenance, but as part and parcel of it. Use does

not create the right, and disuse cannot destroy or suspend it."

This doctrine, that the right of the riparian owner depends not upon use but upon his ownership of the riparian soil, is discussed and strongly reenforced in Hargrave v. Cook, 108 Cal. 72; also in Whitney v. Wheeler Mill Co., 151 Mass. 396, and Reeves v. Backus-Brooks Co., 83 Minn. 339.

SEC. 29. The Underflow is a Subterranean Stream.

The underflow of the Arkansas river in Kansas is a well-defined subterranean stream, distinct from underground or percolating waters, the right to which vests in the owner of the surface, and its unlawful diversion, deprivation or diminution is a substantial wrong, for which equity will grant relief.

It is alleged in the amended bill "that the valley of the river is composed of sand covered with alluvial soil, and the river and the surface soil of the bottom lands in the state of Kansas are all underlaid with sand and gravel, through which the waters of said river have flowed from time immemorial, extending in width under the entire valley for its whole length through the state of Kansas."

It is further alleged that "the natural course and flow of said river throughout its entire length in the state of Kansas is in and beneath the bed thereof and beneath the surface of the bottom lands of the entire valley of said river."

It is further alleged that "the underflow is confined to the valley of the river and is coextensive with the valley, and varies in volume with the amount of water in discharge in the river."

It is further alleged that "the water which flows in the river from the state of Colorado into the state of Kansas furnished the principal and almost the entire supply of water for the underflow in the valley of said

river, and at its normal height the said underflow is of great and lasting benefit to the said bottom lands, both as to those which abut upon said river and as to those which do not; and is of great benefit to the people owning and occupying such lands, for that it furnishes moisture sufficient to grow ordinary farming crops in the absence of rainfall, and furnishes water, at a moderate depth below the surface, for domestic use and for the watering of animals."

It is further alleged that "the flow of water in the river-bed is also of great value to the people in the vicinity by reason of the fact that evaporation from said river tends to cool and moisten the surrounding atmosphere, thereby greatly promoting the growth of all vegetation, enhancing the value of lands in that vicinity, and conducing directly and materially to the public health and making the locality habitable."

It is further alleged that, "if the surface flow of water in the bed of said river be wholly cut off from the state of Kansas, then the underflow will gradually diminish and run out, and the valley of the Arkansas river will become as arid and uninhabitable as is the upland and plateau along its course, since, without said underflow, the valley land will be unfit for cultivation and the arid lands unavailable for grazing."

It is further alleged in the bill that the state of Kansas owns two tracts of land in the Arkansas valley, which are both moistened and sub-irrigated by the underflow from the Arkansas river, one tract being occupied by the Soldiers' Home, near Dodge City, and the other tract being occupied by the State Reformatory, near the city of Hutchinson. It is further alleged in regard to these lands owned by the state of Kansas, that they are "furnished with moisture sufficient for the growing of crops thereon solely from the underflow of said river."

It has been shown in section 10 of this brief that the underflow of the Arkansas valley has a known and recognized level of its waters, has a known and recognized current with a positive direction and a certain velocity, and also has a known and recognized boundary. The level of the underflow under the first bottom lands is on an average from two to five feet beneath the surface, and on the second bottom lands is from five to ten feet beneath the surface. The direction of the current of the underflow is the same as the general direction of the river. The velocity of the current at Garden City is about ten feet per day, with a maximum velocity, as shown by one experiment of Professor Slichter, made at Sherlock, of 22.9 feet per day 700 feet north of the river, and at a depth of 28 feet. The minimum velocity of the current of the underflow was found at Deerfield, and was $1\frac{1}{4}$ feet per day 1800 feet south of the river, and at a depth of 21 feet. It was also shown that the velocity of the current increases as we go down the valley below Dodge City. It was further shown, by the testimony of Professor Slichter, that the direction of the current changed forty-three degrees away from the general direction of the river during the continuance of a four-foot flood. It was further shown by the testimony that the current of the underflow throughout practically the whole length of the Arkansas valley is limited and bounded by the foot-hills or uplands on either side of the valley.

These facts being satisfactorily established, the underflow of the Arkansas valley becomes a subterranean stream, under all the definitions of such waters. The underflow of the Arkansas river, therefore, is easily distinguished from what is known as underground waters, which may, in some instances, have a perceptible movement, and in other instances have no current whatever. The underflow of the Arkansas river is also distinguished

from percolating water, which is simply water passing through the soil or through small interstices in all directions and without any known current, and without any movement in any one particular and known direction.

In Farnham on Waters and Water Rights, section 944, page 2726, that author says:

"A distinction is made between water which is merely percolating beneath the surface, and that which is flowing there in a definite stream. Thus, if a surface stream disappears into a sink, so long as its course can be traced, all the riparian rights which had attached while it flowed on the surface will continue while it flows underground. So, when a section of the original bed of a stream has been filled up by sand accumulating on the surface, the water may still find its way along and through its ancient bed, and while its passage may be through sand and gravel, nevertheless it is a part of the flow of the waters of the creek, and governed by the same rules of law as a stream flowing entirely on the surface. So, the underflow of a stream is a portion of it, and governed by the same rule as the stream itself. And the same rule applies, to a greater or less extent, to all streams flowing under the surface. It has been said that an underground current of water flowing in a well-defined and well-known channel, the course of which can be distinctly traced, is governed by the same rules of law that govern streams flowing upon the surface of the earth. But that rule is stated somewhat too broadly. The very fact that the stream is flowing underground requires some modification of the rules governing surface streams in their application to it, and in many cases the difficulty in tracing the exact course of a stream will require considerable modification of the rules. The water of a well-defined subterranean stream may not be diverted, to the injury of the water-supply of a neighboring landowner. So, the water cannot be diverted from a surface stream by tapping an underground vein."

In the case of The Buckers Irrigation Company v.

The Farmers' Ditch Company, 31 Colo. 71, the court says:

"No question of percolating waters is involved, because the waters passing through the sand and gravel constituting the bed of the stream and the lands so nearly adjacent that the only and natural outlet would be through such channel are not percolating waters, as ordinarily defined by the common law; but, as already stated, are a part of the waters of the stream. If they are withdrawn, the result is as much a depletion of the natural watercourse, of which they constitute a part, as though diverted from the surface. Diversion by this means cannot be permitted when the rights of others are injuriously affected, for the natural and direct sources supplying the natural streams of the state must be protected from invasion; otherwise the rights of appropriators could be destroyed. Neither do we pass upon the question of seepage arising from irrigation, because it does not appear that any ascertained quantity of water was collected by either of the ditches from such sources."

In the case of The Platte Valley Irrigation Company v. The Buckers Irrigation Company, 25 Colo. 82, the court says:

"Those acquainted with the arid region know that some of the most important and well-defined streams become almost, and sometimes entirely, dry during a portion of the year, and that there is at all times what is known as the underflow. (Kinney on Irrigation, sec. 44.) This is the subterranean volume of water which slowly finds its way through the sand and gravel constituting the beds of the streams which traverse the country adjacent to the mountains of this section, and to which rights by appropriation may attach. (Ibid.; McClelland v. Hurdle, 3 Colo. App. 430.)"

In Vineland Irrigation District v. Azusa Irrigation Company, 58 Pac. 1057, the court says:

"The existence of a well-defined subsurface flow within the beds and banks of streams such as this is

well recognized. Kinney on Irrigation, section 44, says: 'At certain periods of the year water flows on the surface in a well-defined course, and there is at all times what is known as the underflow.' This is the broad and deep subterranean volume of water which slowly flows through the sand and gravel underlying the most, if not all, the streams which traverse the country adjacent to the mountain systems of the arid region. These underground streams are probably much greater in volume in some cases than the water upon the surface, and are, as far as rights of appropriation or riparian rights are concerned, but a valuable portion of the well-defined surface stream."

In Los Angeles v. Pomeroy, 124 Cal. 597, 623, the court says:

"There is no dispute between the parties, and no conflict in the authorities, as to the proposition that subterranean streams flowing through known and definite channels are governed by the same rules that apply to surface streams. The cases in which this and cognate questions have been raised and decided are innumerable, and it would be an endless task to review or even to name them. No case involving directly the rights of parties in subterranean streams has been decided in this court, but the law, as applicable to the present case, is well epitomized in section 48 of Kinney on Irrigation, as follows: 'Subterranean or underground watercourses are, as their names indicate, those water currents that flow under the surface of the earth. A large portion of the great plains and valleys of the mountainous regions of the West is underlaid by a stratum of water-bearing sand and gravel, and fed by the water from the mountain drainage. This water-bearing stratum is of great thickness. The water is moving freely through it, is practically inexhaustible, and, if it can be brought to the surface, will irrigate a large portion of the country overlying it. In and near the mountains many streams have a bed which was originally a rocky canon, but has been filled up with boulders and coarse gravel. In this debris a large portion or all of the water sinks from sight, to reappear

only when some rocky reef crosses the channel and forces the water to the surface. The movement of this water through the porous gravel, owing to the declivity of the stream, is often quite rapid, and a considerable volume may thus pass down the channel hidden from sight. These watercourses are divided into two distinct classes: Those whose channels are known and defined, and those unknown and undefined. It is necessary to bear this distinction in mind in our discussion, as they are governed by entirely different principles of law; and, in this connection, it will be well to say that the word 'defined' means a contracted and bounded channel, though the course of the stream may be undefined by human knowledge, and the word 'known' refers to knowledge of the course of the stream by reasonable inference. Regarding the laws governing these two classes, it must be known that if underground currents of water flow in well-defined and known channels, the course of which can be distinctly traced, they are governed by the same rules of law that govern streams flowing upon the surface of the earth. The owner of land under which a stream flows can therefore maintain an action for the diversion of it, if such diversion takes place under the same circumstances as would enable him to recover if the stream had been wholly above ground. But for this purpose the underground water must flow in known and well-defined channels, so as to constitute regular and constant streams, in order that the riparian owner or appropriator may invoke the same rules as are applied to surface streams, or otherwise the presumption will be that they have their sources in the ordinary percolations through the soil. This rule practically disposes of the second class of subterranean waters—those whose channels are unknown and undefined—although there are undoubtedly a great many underground streams whose waters flow in confined channels, but whose courses are not known; and, following the above rule, these are all classed with 'percolating waters.' The point to be specially noted here is the meaning ascribed to the words 'defined' and 'known.' 'Defined' means a contracted and bounded channel, though the course of the stream may be unde-

fined by human knowledge; and the word 'known' refers to knowledge of the course of the stream by reasonable inference. In this case the boundaries of the channel and the existence and course of the underground stream were unknown and undefined, except so far as they could be inferred; but there was a great amount of evidence from which a reasonable inference could be drawn that the channel was bounded and defined by the sloping sides of the Cahuenga and Verdugo hills meeting underground, and that there was a subsurface flow corresponding with the surface flow from west to east out through the gap. Without any excavation beneath the service, or other test or experiment, all this could be inferred from the topography of the country, the amount of rainfall, and the gradually augmenting volume of the surface stream in its approach to the narrowest point in the pass. And the court was certainly justified in submitting to the jury the question whether the subsurface flow was a part of the stream, unless the mere fact that it was forcing its way through sand and gravel and boulders deprived it of the character of a stream. Upon this point we are satisfied that the view of the superior court was the reasonable and just view, and not opposed to anything that has ever been decided in this court."

In Kinney on Irrigation, section 78, page 123, that author says:

"In the case of Dickinson v. Grand Junction Canal Co., *supra*, POLLOCK, C. B., in delivering the opinion, said: 'When water is on the surface the right of the owner of the adjoining land to the usufruct of that water is not a doubtful matter of fact; it is public and notorious, and such a right ought, as a matter of course, to be respected by every one; and, indeed, if the course of a subterranean stream were well known, as is the case with many which sink underground, to pursue for a short space a subterranean course and then emerge again, it never could be contended that the owner of the soil under which the stream flowed could not maintain an action for the diversion of it, if it took place under such circumstances as would have enabled him to re-

cover if the stream had been wholly above ground. . . . If, then, the stream is diverted by altering its course or cutting down its banks, or the water abstracted from it for unauthorized purposes, the owner has his right of action against the wrong-doer.''

In the case of Case v. Hoffman, 84 Wis. 438, the court says:

''A natural watercourse is also as well defined and the law that governs it stated in our own cases as anywhere. Says Chief Justice Dixon, in Hoyt v. Hudson, 27 Wis. 656: 'The term ''watercourse'' is well defined. There must be a stream, usually flowing in a particular direction, though it need not flow continually. It may sometimes be dry. It must flow in a definite channel, having a bed, sides, or banks, and usually discharge itself into some other stream or body of water.' The following streams are held to come within this definition: In Spelman v. City of Portage, 41 Wis. 144, the streams held to be watercourses were across the low grounds of considerable extent between said rivers, which had their origin in the overflow of the Wisconsin river to the Baraboo river, caused by unusual freshets. They had no well-defined channels or banks, but spread widely over the intervening ground. They came from one unquestionable watercourse and passed into another one, and did not lose their character as watercourses by passing and spreading over the intervening low ground. In Gillett v. Johnson, 30 Conn. 392, there was a living spring about sixteen rods from the dividing line, on the land of the defendant. It ran off in a stream that would fill a half-inch pipe. The supply was constant, except in a very dry time. For six or eight rods it ran rapidly, between abrupt banks, and in a well-defined channel. It then came to marshy ground, where it spread out, so that its flow was slight, in a sluggish current, but in a natural bed or depression, to a watering-place on the plaintiff's land. The defendant diverted the stream on his own land from the watering-place of the plaintiff. It was held to be a watercourse, and the defendant liable. In Macomber v. Godfrey, 108 Mass. 219, the stream came across a road onto the defendant's land in a well-defined chan-

nel, but when within five rods of the plaintiff's land, below, it spread out several rods in width, and so it ran upon the plaintiff's land, which was a flat and level meadow, where it irrigated it in a valuable manner, and there was no defined channel on the plaintiff's land; but a short distance below his land it again formed into a brook, with a channel and current, and so ran on and emptied into a river. Held to be a watercourse, which the defendant could not divert from the plaintiff's land. In Miller v. Laubach, 47 Pa. St. 154, the waters came from winter springs on defendant's land, and soon spread out and made his land wet and boggy, and they were wont to pass onto the plaintiff's land, and there soon dry up by evaporation. The defendant cut a ditch on his own land, which gathered the waters together, and discharged them on the plaintiff's land in such a manner as to cause him great injury, by making his land wet and useless. The defendant was held liable. In Kauffman v. Griesemer, 26 Pa. St. 407, the stream came from springs on the plaintiff's land, which, increased by rains and snow, ran down on and through the defendant's land, and emptied into a creek. They ran in a general channel, but their flow was not continuous. The defendant made a sod dam at his line, and thereby turned the waters back onto the plaintiff's land, to his injury. It was held that this stream was a watercourse, and governed by the maxim of the common law, '*Aqua currit et debet currere*,' and the plaintiff recovered. In Rhoads v. Davidheiser, 133 Pa. St. 226, 19 Atl. 400, it is held that even surface-water, if it run in a channel with banks and current, and in a certain direction, when there is water, although not continuously, is a watercourse, and governed by the same law. In Earl v. DeHart, 12 N. J. Eq. 280, it is held that when the country is such that the water from rains and melting snow is necessarily collected into one body so large as to require an outlet, and is discharged through it in a well-defined channel, where it is accustomed to flow, and has flowed from time immemorial, such channel is an ancient watercourse. The common-law doctrine prevails in New Jersey. A spring without an outlet or inlet is not a watercourse, but if it have an outlet through

a well-defined channel it is a watercourse. (Village of Delhi v. Youmans, 50 Barb. 316.) Where a spring rises on one man's land, and from it a spring runs with a current and in a well-defined channel onto the land of another below, although it furnished no more water than the superior proprietor could use for domestic purposes and to water his land, he cannot divert or wholly consume it, to the detriment of the inferior owner. (Arnold v. Foot, 12 Wend. 330.) Smith v. Adams, 6 Paige, 432, is to the same effect. 'A spring, to be protected by the law, must be one which issues out of the earth by natural forces.' (Gould, Waters, sec. 286.) A spring becomes a watercourse at the point where the water comes to the surface and flows off in a defined channel or bed, with banks or shores which confine the water and cause it to run in a certain direction. (Id., sec. 41.) It must have a current, or it cannot be obstructed or diverted, to any one's injury. If a watercourse is lost in a swamp or lake, it is still a watercourse if it emerges therefrom in a well-defined channel, or if it spreads over a meadow, and it can be identified or traced as the same stream, it is still a watercourse. (Id., sec. 264; Briscoe v. Drought, 11 Ir. C. L. 250; Munkres v. Railroad Co., 72 Mo. 514; Road Co. v. Harvey, 90 Ind. 192; Robinson v. Shanks, 118 id. 125, 20 N. E. 713.) 'If the channel and banks formed by running water present to the eye at a casual glance the unmistakable evidence of the frequent action of running water, then it is a natural watercourse.' (Gould, Waters, sec. 264.) I will close these citations by a very strong case in favor of the plaintiff's right, in this court. The plaintiff owned a mill at Cross Plains, on Black Earth creek. The creek had its rise in Mud lake, in another town, which lake was partially fed by springs, but mainly by rains and surface-waters, and out of it the waters flowed through an outlet into Black Earth creek, but the outlet had been considerably filled up. The defendant sought to excavate an outlet on the opposite side of said lake and draw off the water into a big marsh, and so eastwardly by Pleasant Branch into Lake Mendota, and wholly divert them from Black Earth creek, to the injury of the plaintiff's mill power. In Mohr v. Gault, 10 Wis. 513,

Chief Justice Dixon said, in passing upon the above facts: 'The owners along the creek have a legal right to the natural and usual flow of the waters of the lake through it.' It is said also in the opinion, as it was also found by the trial court, 'that there was no perceptible fall or difference in the height of the surface of the lake from one end to the other. The depth of this lake was from two to seven feet, and the main body was covered by vegetation. The waters had been raised one and a half feet by the filling up of this outlet, and more than that by surface-waters running into it from the adjacent country.' The defendant sought to divert the waters of the lake in the proposed direction, in order to drain his own land, covered by its waters to the depth of from a few inches to three feet. From this it appears that this lake is protected as a natural watercourse. Application may now readily be made of these principles and authorities to the waters described in the complaint.''

As we have shown elsewhere, were this great subterranean stream merely percolating waters, our right to such waters, undiminished by the acts of Colorado, would still be clear. But the courts of Colorado have held this stream to be part and parcel of the surface flow, and we are curious to see how the defendants will meet these decisions of the highest court in their own state. If, however, there were no surface flow at all, this great moving body of water would still come clearly within the definition of a subterranean stream. In section 10 of this brief will be found the facts as to the stream. It will be there seen that a great number of residents of the valley, many of them for a third of a century, and all the experts who have examined this flow, measured its velocity, and explored its depths and width, concur in the precise descriptions by which the law recognizes subterranean streams as distinguished from percolating waters. They unite in declaring that it has well-defined limits on each side, an almost uni-

form depth, and a steady appreciable current, with a well-established direction. We are therefore justified in our claim that our rights in this flow are first to be considered from this standpoint.

SEC. 30. The Arkansas City Water Power a Vested Right.

The use of the water of the river for water power at Arkansas City became a vested right, and as to that right the subsequent diversion of the water by Colorado, decreasing if not wholly destroying such water power, is a continuing wrong which equity will enjoin.

As heretofore shown, in section 13 of this brief, the canal company was chartered by the state of Kansas on the 17th of December, 1880, and furnished 425 horse-power to the different mills and factories built along its banks. The furnishing of this power and the building of these flouring and manufacturing mills was the beginning of the prosperity and growth of Arkansas City. The building of these mills had an immediate effect upon the value of agricultural lands in the vicinity of Arkansas City. These lands became more valuable and were placed upon the tax-rolls at an increased valuation, and the state of Kansas derived an increased revenue therefrom. These rights of the state of Kansas, the water-power company and all others interested therein became vested rights as early as the year 1882, and continued unimpaired until affected by the diversion of the waters of the Arkansas river in the state of Kansas, beginning about the year 1888. The water-power company at Arkansas City used the water of the river for power purposes under the authority of the common law, turning the water back into the Arkansas river after its use. The rights that were built up between the years 1881 and 1890 were property rights under the doctrine of the common law authorizing the diversion of the waters of the stream for these purposes,

and these rights inured to the benefit of the state of Kansas, and to the benefit of the power company, and to the benefit of the owners of these mills and factories, and became vested rights under the law of the land that could not be interfered with or impaired by a subsequent diversion of the waters of the Arkansas river. The law upon this proposition is so well and firmly settled that but few citations of authority would seem necessary, but we cite the following: Kimberly v. Hewitt, 75 Wis. 374; Union Water Power Co. v. Auburn, 90 Me. 65. It will be seen by these decisions that the right to use water of a river for furnishing power without diminution of its flow is a riparian right which attaches to the land. It vests in the ownership of the land, and as such it cannot be injuriously affected by the upper riparian owner, as has been done in this case by the diversion of the water in Colorado.

SEC. 31. The Vested Right in the Irrigation System.

The state of Kansas has a vested right in the system of irrigation in western Kansas, and may maintain and protect such system, affecting a large part of its territory and a great number of its citizens, by any appropriate action.

Between the years 1879 and 1888 an irrigation system grew up in the Arkansas valley in western Kansas. Eight different corporations were chartered by the state of Kansas between October 8, 1879, and November 29, 1887, and these companies were organized for the purpose of irrigating the bottom lands along the Arkansas river between the state line and Kinsley. These corporations were referred to in section 14 of this brief, and the dates of their charters were there given, and the evidence shows that within one or two years after the corporations were chartered the ditches were constructed and the water was turned in and used. A few other and

smaller ditches were also constructed by private individuals. The charters of all these corporations were introduced in evidence as exhibits Nos. 13, 46, 47, 48, 48½, 49, 49½, 54, and 54½. These corporations are still in existence, and operating under the laws of the state of Kansas.

The state of Kansas has passed a number of laws for the protection of the system of irrigation suited to this part of the state of Kansas. This irrigation system was built up with the consent and under the control of the state of Kansas, and in that system the state of Kansas has now a vested, legal and constitutional right, and such a right as cannot be impaired or interfered with by subsequent acts of any other state, or by the citizens of any other state. The acts of Colorado and its citizens, who are the defendants in this case, of which we complain, were all subsequent to the establishment of this irrigation system in the five western counties of Kansas through which the Arkansas valley extends. In fact, it was from this system in Kansas that Colorado and her citizens conceived the idea of successful irrigation along the Arkansas river. Their system has grown as ours has diminished. The success of their system has been the destruction of ours, and their prosperity is built upon our misfortune. The water of the Arkansas river was used within the boundaries of Kansas many years prior to the depletion of the river west of the state line by the defendants in this case. By the enhancement of the value of these lands the state of Kansas derived a great and increasing revenue from taxation, and in these taxes the state of Kansas has a vested right inuring to its benefit long prior to the depletion of the river by the defendants in the state of Colorado.

In this case the state of Kansas is not appearing for any individual or any corporation, for any ditch com-

pany, or for any individual owner of land under these ditches. The state of Kansas is not defending any particular title, nor any single right connected with any particular piece of land. It is not attempting to establish the exact date of a particular priority, nor is it attempting to sustain the right of any individual or corporation to a particular amount of water that was used in any ditch for the purposes of irrigation. No such allegation as that is found in the bill, and no proof was introduced in evidence to sustain such a claim. The state of Kansas, on the contrary, however, appears as *parens patriæ*, guardian or trustee, of all these interests which have been vitally affected or wholly destroyed. The state of Kansas has a prior and vested right in this whole system, extending through five counties, including more than 200,000 acres of land, profitably employing many thousands of its citizens, and yielding an annual revenue that helped to sustain its institutions and pay its expenses. The injury to this irrigation system is a real, legal and well-founded injury, and for which the state of Kansas has a right to seek relief in this court and in this case.

SEC. 32. The Revenues of the State have been Diminished.

The state of Kansas derives its financial support from the taxes levied upon the property within its boundaries. The property thus taxed for the support of the state consists not only of real estate but of personal property. That the values of real estate in the Arkansas valley have been materially affected by the diversion of the waters of the Arkansas river in the state of Colorado has been abundantly shown by the evidence introduced. All the witnesses testified that the lands of the valley were not as valuable as they would have been if the diversion of the waters had not been made in the upper state. The evidence contained and referred to in

section 16 of this brief is very conclusive upon this point, though it is somewhat depressing. The county clerk of Finney county introduced his records showing the assessed valuation of fifteen quarter-sections of land in that county, made at three different periods, in 1889, in 1897, and in 1903. These quarter-sections were taken at random by the clerk, and are fairly typical and justly representative of the conditions in and about Garden City of the lands embraced within the irrigation system. In the year 1889 eight of these quarter-sections of land had an assessed valuation of $450 each, two of $500 each, and five of $600 each. At the time these assessed valuations were made the injurious effects of the depletion of the waters of the Arkansas river in Colorado had scarcely been felt, and had made no material diminution in real-estate values. The assessed valuation of these same lands was given also for the year 1897. At that time four of these same tracts of land were assessed at $240 each, four at $250 each, four at $260 each, one at $280, and two at $300 each. In the year 1903 these same lands were again assessed for the purposes of taxation, and at this time two of these same tracts were assessed at $150 each, three at $165 each, five at $175 each, four at $190 each, and one at $215. The total assessment of these fifteen quarter-sections of land in 1889 was $7600, while the total assessed valuation of these same tracts in 1897 was $3680, and in 1903 was $2645. If the rate of taxation for state purposes remained the same, and was continued at five mills on the dollar, the loss in revenue to the state of Kansas on these fifteen quarter-sections of land in Finney county alone would be $24.775 a year. There are 2400 acres in these fifteen quarter-sections, and there are about 235,000 acres under ditch in the five western counties, and perhaps about 100,000 acres had been actually irrigated. If other lands in the Arkansas valley have decreased in

the same proportions as the ones referred to, the loss to the state of Kansas in revenues derived from taxation in the five counties of Hamilton, Kearny, Finney, Gray and Ford alone would amount to many thousands of dollars each year. The loss in acreage of alfalfa in Edwards county, as shown by the records introduced, between the years 1898 and 1904, was 4146 acres. The state of Kansas has a direct and an indirect interest in all the crops grown within its limits The evidence shows that the corn crop of the Arkansas valley has been decreased one-third, that the alfalfa crop has been decreased one-half in yield per acre, and that other crops in the bottom lands have been decreased in about the same proportion. The loss to the state from revenue upon personal property in these counties has also been enormous. The decrease in valuation in the lower part of the Arkansas valley may not be as great a per cent. of its higher valuation in the early years as that shown in the decrease in the western counties, but even in these counties the decreased valuation has been noted because of the loss of the water in the Arkansas river. When we add together the decreased valuation of lands in the Arkansas valley and those adjoining it because of the depletion of the water of the Arkansas river, and the decreased production of crops and all other forms of personal property, and the loss in property values, both real, personal, and mixed, in the cities along the Arkansas river in Kansas, the total loss in property values, making a basis for the assessment of state taxes, amounts to many thousands of dollars a year, and perhaps has never been fully realized, and certainly has never been accurately computed. It is sufficient, however, to say that this loss in revenue to the state of Kansas has been material, and far greater than generally considered until these examinations were made.

The state of Kansas has not only been deprived of

revenues derived from taxation upon lands owned by individual citizens, but has been deprived of a large revenue from its own lands located at Dodge City and Hutchinson. All the witnesses agree that these lands have not been as productive since the water in the river has been abstracted as they were prior to this depletion. The amount of this injury we may not be able to accurately estimate, but it is also substantial and material.

The state of Kansas has been deprived of another source of revenue to which it had a legal right. Under the laws the state became the owner of sections 16 and 36 of every congressional township for school purposes, and these lands were to be sold for the benefit of the state school fund of Kansas. The value of these lands situated in the Arkansas valley or near thereto has been affected in the same proportion as the lands owned by private citizens, and instead of finding a sale for these lands at a profitable valuation they are still owned by the state, or have been disposed of at a greatly decreased price.

Thus it is seen that the revenues belonging to the state of Kansas have been decreased year by year by the acts of the defendants in this case. The aggregate amount of these losses has been not only enormous, but is beyond definite calculation, and these losses can only be repaired by a proper decree of this court, restoring to the state of Kansas those interests and rights which were guaranteed to it by the law of the land.

SEC. 33. Vested Rights are not Affected by State Lines.

In considering the rights herein claimed and the wrongs thereto, state lines are not to be considered as barriers to such rights or defenses against such wrongs. But when the rights of the complaining state and the defending state as to the flow of the river are mutually fixed, each may use its own according to its own laws

and customs, and the existence of such laws and customs is no ground of attack or defense, except in so far as it impairs the rights of the other.

As we have clearly shown heretofore in this brief, the rights of Kansas and those for whom it sues accrued and were vested prior to the existence of Colorado as a state. When, on August 1, 1876, the territory of Colorado was erected into one of the states of the Union and became a political sovereignty, a greater portion of the Arkansas valley had been settled. The rights of these settlers as riparian owners had become vested in them. They had settled upon and bought their lands from the government and other settlers because of the flow of the Arkansas river, because of the great advantages to be found in this valley, that are set forth in our testimony. They bought under the common law, which attached to all of this territory, and fixed and defined the rights of every landowner from Arkansas City to the Rocky Mountains. No power under our system of government could therefore deprive them of their rights, or even impair or diminish them, without making compensation therefor. These rights so acquired were as sacred to each of these owners as the right to life or liberty. No court, no state nor the federal government, could in any wise impair those rights. The contention of Colorado that, because of her sovereignty over certain territory in which the Arkansas river rises and has its sources, she could destroy these vested rights by her system, her customs, and her enactments, and that her state lines should constitute an insurmountable barrier beyond which the citizens of Kansas, wronged as herein shown, could not penetrate, finds no support or warrant in any decision of any court of the United States.

The state line between Colorado and Kansas is a political division, nothing more. It limits the jurisdiction of each; that is all. The citizens of Colorado

may no more injure the rights of the citizens of Kansas across the line than they may injure the rights of fellow citizens in Colorado. The writs of Colorado do not run beyond that line, but the courts of Kansas stand open to afford remedies to the citizens of Colorado wronged by the citizens of Kansas as widely and freely as they do to their own citizens. The federal government has established an arbitrary line between Colorado and Kansas for the purpose of separating their respective jurisdictions. The federal government has never attempted to set up a state line as a barrier against one citizen who complains of another, nor refused relief to the citizen of one state against those of another, and we believe this is the first time in any court of justice it has been seriously contended that because a wrong has been committed against the citizen of one state by a citizen in another state, therefore, and because of that fact, there is no remedy. It has been contended that Kansas itself makes use of the waters of the Arkansas river for irrigation, and because of that fact we cannot be heard to say that Colorado is wrong in making the same use. We say that when once the rights of Colorado and Kansas are fixed in the flow of this river, when it is determined by this court to what extent each shall enjoy the use of it, then neither state has a right to say how the other shall use its share of the water. We have no quarrel with irrigation in Colorado as such ; we only complain when irrigation in Colorado wrongs us, not because it is a certain use of the water, but because the kind of use infringes upon our rights. If our use of the water in Kansas impaired any right that Colorado has she might be heard to complain of that use, not because of the kind of use that we make of it, but because it injured them. So we assert, without any fear of contradiction, that, so far as this case is concerned, in this

lofty tribunal, which ignores state lines and political subdivisions, for the purpose of justice, this invisible political line between the two states shall not be a barrier to our rights nor a defense against our wrongs, nor shall either state be heard to complain of the use made by the other of the waters of this interstate river, except in so far and to such extent as such use is unlawful and infringes upon the rights of the other. Colorado has its system by which it determines the use of the flow of its own streams. Kansas has its system. We make no complaint of the Colorado system, and its customs or enactments, except in so far as it deprives our citizens of their vested right, accrued and settled upon them before the existence of Colorado as a state. We repel Colorado's contention that she can prevent us from taking the waters of the Arkansas river as they were accustomed to flow for fear that we might make some use of the water unlawful to the common law. We are entitled to the Arkansas river as it was accustomed to run; whatever of Colorado customs, enactments or practices deprives us of that flow is to that extent unlawful, to that extent without right, and we complain of that—no more, no less. Whatever there may be of the waters of the Arkansas river above its normal flow we make no claim to. Colorado and the federal government may settle that; but to the full extent of its normal flow as it was accustomed to run in all the years from the earliest times down to about 1888 we are as much entitled as to the air we breathe here in Kansas, to the soil of the valley which we have bought and paid for, believing that we bought with it these vested rights.

The rights of the several states or territories through which a river runs are well stated in volume 1 of Farn-

ham on Waters and Water Rights, page 29, and we quote from that valuable work:

"A river which flows through the territory of several states or nations is their common property. Each is entitled to its navigation throughout its whole extent, so far as it can be exercised without injury to the rights of others. It is a great natural highway conferring, besides the facilities of navigation, certain incidental advantages, such as fishery and the right to use the water for power and irrigation. Neither nation can do any act which will deprive the other of the benefits of those rights and advantages. The inherent right of a nation to protect itself and its territory would justify the one lower down the stream in preventing by force the one further up from turning the river out of its course, or in consuming so much of the water for purposes of its own as to deprive the former of its benefit. Conversely, the upper owner would have a right to prevent an obstruction of the stream which would prevent fish from ascending to its shores, or interfere with its rights of navigation. To prevent resort to force, courts of arbitration would protect these rights, and the courts of the respective nations will prevent acts on the part of their own subjects which interfere with the rights of subjects of other states. And courts having a supervisory jurisdiction over the acts of the political department of government will prevent acts by that department which will injure the rights of neighboring states. The gifts of nature are for the benefit of mankind, and no aggregation of men can assert and exercise such rights and ownership of them as will deprive others having equal rights, and means of enjoying them, of such enjoyment. The acts of nations must be governed by principles of right and justice. The days of force and self-aggrandizement at the expense of neighboring nations are past, and the common right to enjoy the bountiful provisions of providence must be preserved. This principle does not prevent the lower nations from throwing bridges across the stream, if they are so constructed as not to destroy the navigation, although it may be rendered somewhat more difficult, so that greater

precautions, or a modification of the character of vessels, is necessary, if an unreasonable burden is not thereby imposed upon such navigation. But bridges must not be such as to affect revenues and destroy the trade of the upper state. One state cannot authorize changes in the river which will injure property in another state. And the upper state cannot divert the water, to the injury of property or the destruction of navigation lower down, and attempts to do so will be restrained by courts having jurisdiction of the parties. Nor has the upper state a right to pollute the water in such a way as to render it unfit for domestic use in the lower one."

In the case of Pine *et al.* v. Mayor etc. of City of New York, 112 Fed. Rep. 98 (C. C. A. 2d Cir.), it was held that

"A state cannot, in exercise of its power of eminent domain, authorize one of its municipalities to divert the waters of a non-navigable interstate stream, to the injury of riparian owners on such stream in another state. The right of such owners to the use of the water flowing in its natural channel is not an easement, dependent upon servitudes upon lands above, in the other state, which such state may extinguish on making constitutional compensation, but is inseparably annexed to the soil, and is parcel of the land itself; and the diversion of the water in the state above is a taking of property outside the limits of the state, and beyond its jurisdiction.

"Where a city in New York, acting under authority of a state statute, is proceeding to divert the waters of a non-navigable stream in that state for municipal purposes, to the injury of riparian owners below, whose lands are situated in Connecticut, such owners are not confined to the remedy given by the New York statute to obtain compensation for the injury; but, the act being a tortious taking of their property in Connecticut without authority of law, they may maintain a suit in equity to enjoin the same."

In the case of Holyoke Water Co. v. Connecticut

River Co., 22 Blatchf. 131, 20 Fed. 71, 52 Conn. 570, decided by SHIPMAN, J., in the United States circuit court for the district of Connecticut, the Connecticut legislature authorized the Connecticut River Company to raise their existing dam across the river in Connecticut in order to improve the navigation and also maintain the water power of the company. The raising of the dam in Connecticut would injure the water power of the Holyoke Company, located in state of Massachusetts. Judge SHIPMAN entered a decree enjoining the raising of the dam, upon the theory that the state of Connecticut had no power to authorize the building of a dam across an interstate stream which would cause damage to property in another state located upon the same stream.

In Rutz v. City of St. Louis, 7 Fed. Rep. 438, the plaintiff owned real estate on the Illinois side of the Mississippi river. He alleged that the city of St. Louis had unlawfully located on the Missouri side of the river a dyke which had caused forty acres of the plaintiff's land to be washed away. In passing upon a demurrer to the bill, TREAT, J., said:

"Missouri cannot pass a law to govern Illinois, its citizens, and their realty situate in Illinois. If, pursuant to a Missouri statute, a dyke was erected destructive of property in Illinois belonging to the citizens of the latter state, such statute cannot be pleaded against them, for the Missouri statute could not operate extraterritorially."

An article in 8 Harvard Law Review, p. 138, entitled "Power of a State to Diverte an Interstate Stream," is an instructive one upon the proposition under consideration.

In the case of Howell v. Johnson *et al.*, 89 Fed. Rep. 556 (C. C. Mont.), it was held that

"One who has acquired a right to the water of a stream flowing through the public lands by prior appro-

priation, in accordance with the laws of the state, is protected in such right by Revised Statutes, sections 2339, 2340, as against subsequent appropriators, though the latter withdraw the water within the limits of a different state."

In Hoge v. Eaton, 135 Fed. 411 (C. C. Colo.), the following was held to be the law:

"The right to divert running waters for irrigating lands in an arid country is not controlled or affected by political divisions. It is the same in all states through which the stream so diverted may pass.

"An appropriation of water in the state of Wyoming from a stream which rises in Colorado for irrigating lands in Wyoming is valid as against a subsequent appropriation in Colorado from the same stream for irrigating lands in Colorado.

"In a suit by settlers in Wyoming on a stream which rises in Colorado to restrain the diversion of water from such stream in Colorado, complainants need not aver or prove that they have conformed to police regulations of the state of Wyoming regulating the distribution of water in that state."

In the opinion of Judge HALLETT, in the case last cited, the following apt statement of the law is made:

"The idea of an exclusive right in the people of a state to divert its running waters, to the injury of riparian owners in another state, must be equally untenable. Indeed, the doctrine of riparian ownership and use of running water is not subject to political boundaries. Between hostile states the doctrine may not be recognized, but any such repudiation would be simple *vis major*. Between the states dwelling in peace and concord, as are the states of our Uuion, the equal right of the inhabitants of each state to the waters of intersecting streams must always be recognized. Water is essential to human life in the same degree as light and air, and no bounds can be set to its use for supplying the natural wants of men other than the mighty barriers which the creator has made on the face of the earth."

In the case of United States v. Rio Grande Dam & Irrigation Co., 174 U. S. 690, it was held that

"In the absence of specific authority from Congress, a state cannot by its legislation destroy the right of the United States, as owner of the lands bordering on a stream, to the continued flow of its waters. . . .

"The jurisdiction of the general government over interstate commerce and its natural highways vests in that government the right to take all needed measures to preserve the navigability of the navigable watercourses of the country, even against any state action."

See, also, Conant v. Deep Creek etc Co., 23 Utah, 627, 66 Pac. 188.

In 1855 the attorney-general of Pennsylvania was called upon by the governor of the state for an opinion as to the right of New York to divert from their natural bed and channel the waters of the Chemung river. The opinion is an able one, and denies the right claimed by the state of New York. It is reported in 4 American Law Register, page 385. In the course of this opinion, this statement of the law is made:

"The domain of a state includes the lakes enclosed within it, and the rivers which flow through its territory; but the running water of a river cannot be appropriated, either by a state or its inhabitants, in such manner as to prevent its natural flow into the territories of a state below, and thus to deprive the lower state or its inhabitants of the use of the river and its water in as beneficial a manner as they would otherwise be able to enjoy it. The entire or partial diversion of the waters of a river from its natural channel, so as to make them discharge themselves by another outlet, is an exclusion of the lower state from its right to have the use of the waters of the river without diminution, in its passage through its territory."

See, also, the opinion of Story, J., in Slack v. Walcott, 3 Mason, 517.

SEC. 34. Defendants not Protected by Federal Law.

The defendants in this case can claim no protection in appropriating and monopolizing the whole flow of the Arkansas river in Colorado by virtue of any federal enactment or federal decision. The act of July 26, 1866, section 2339, Revised Statutes of United States, 429, lends no support to their contention, and gives no color of right to their acts. This federal statute was enacted to apply only to the territories and did not and could not affect prior vested rights. It is simply a law as between appropriators of water, and not a law as between riparian rights already vested and appropriators. It is not necessary for us to make extensive quotations from the numerous decisions construing this statute at the present time, and we content ourselves with citing a few of the leading cases:

Atchison v. Peterson, 20 Wall. 507.
Basey v. Gallagher, 20 id. 671.
Jennison v. Kirk, 98 U. S. 456.
Sturr v. Beck, 133 id. 541.
United States v. Rio Grande Co., 174 id. 690.
Schwab v. Beam, 86 Fed. 41.
Howell v. Johnson, 89 id. 556.
Pine v. New York, 103 id. 337.
Benton v. Johncox, 17 Wash. 277.
Gould v. Eaton, 117 Cal. 539.
New Whatcom v. Fairhaven Co., 64 Pac. 735.

This question was elaborately discussed by us in the original brief upon the demurrer to the bill in this case, and the enactments, both of the general government and of the state of Kansas, with reference to the title acquired by Kansas, were printed in full in that brief, on pages 44 to 62. We may, however, briefly restate our contention upon this point:

By the land grant of 1863 and its acceptance by the

state of Kansas in 1864 the fee-simple title of every odd-numbered section of a strip ten miles wide on each side of the Atchison, Topeka & Santa Fe railroad was granted to the state of Kansas. The title to these lands afterward was conveyed by the state of Kansas to the railroad company, and the greater portion of these lands was subsequently sold by that company to individual owners. This grant includes more than 1,500,000 acres of land in the Arkansas valley in Kansas, and the greater portion of these lands are riparian lands within the valley, and the injury to these lands would be sufficient to warrant the state of Kansas in maintaining this action. The riparian rights under the common law as to those lands was vested in the state of Kansas in the year 1864, and could not possibly be divested by any subsequent act of Congress, or by any act of the state of Colorado or its citizens.

Many of the claims of the state of Kansas in this case, and of the defenses set up by the defendants, have been forever settled by the decision of this court in the case of United States v. Rio Grande Co., 174 U. S. 690. This case was so recently decided that we need make no quotation from the opinion of the court. No statute, no enactment of Congress, was ever passed attempting to affect the prior vested rights inuring to the citizens of a state, and the defendants can find no support for the claims set up by them in this case based upon federal statutes or federal decisions.

SEC. 35. Relief under International Usage.

Treating Kansas and Colorado in all respects as separate nations, and ignoring the vested rights of Kansas under the common law, the contention of Colorado with respect to its right to divert all the waters of the Arkansas river is untenable, and Kansas is entitled to relief.

In the opinion of the court filed in this case upon the defendant's demurrer to the bill of complaint, Mr. Chief Justice FULLER said: "Sitting, as it were, as an international, as well as domestic tribunal, we apply federal law, state law and international law as the exigencies of the particular case may demand." Under this statement of the procedure in this court, we insist that, under the rules of international law, Kansas is entitled to the relief prayed for. Such controversies as the one now before the court are not new in international investigations. Upon this point we presented our views at some length in our former brief, on pages 85 to 91, and at that time made sufficient quotations upon the propositions then before this government. These quotations are sufficiently set out in the former brief referred to, to which we respectfully refer the court. Upon this point we further cite: 1 Farnham on Waters and Water Rights, 29; 1 Wharton's International Digest, section 20, pages 62, 63. The message of President Grant, dated December 5, 1870, referring to the disposition on the part of Canada to exclude the citizens of the United States from the navigation of the St. Lawrence, is also in point. In that message the undoubted right of the United States to the free navigation of the river is maintained. From that message we quote the following passage, found in 7 Messages and Papers of the Presidents, page 104:

"During the administration of Mr. John Quincy Adams, Mr. Clay unanswerably demonstrated the natural right of the citizens of the United States to the navigation of this river, claiming that the act of the congress in Vienna, in opening the Rhine and other rivers to all nations, showed the judgment of European jurists and statesmen that the inhabitants of a country through which a navigable river passes have a right to enjoy the navigation of that river to and into the sea, even though passing through the territories of another power. . . .

Since Mr. Clay advanced his argument in behalf of our right the principle for which he contended has been frequently, and by various nations, recognized by law or by treaty, and has been extended to several other great rivers. By the treaty concluded at Mayence, in 1831, the Rhine was declared free from the point where it is first navigable into the sea. By the convention between Spain and Portugal, concluded in 1835, the navigation of the Douro, throughout its whole extent, was made free for the subjects of both crowns. In 1853 the Argentine Confederation by treaty threw open the free navigation of the Parana and the Uruguay to the merchant vessels of all nations. In 1856 the Crimean war was closed by a treaty which provided for the free navigation of the Danube. In 1858 Bolivia, by treaty, declared that it regarded the rivers Amazon and La Plata, in accordance with fixed principles of national law, as highways or channels, opened by nature, for the commerce of all nations. In 1859 the Paraguay was made free by treaty, and in December, 1866, the emperor of Brazil, by imperial decree, declared the Amazon to be open, to the frontier of Brazil, to the merchant ships of all nations. The greatest living British authority on this subject, while asserting the abstract right of the British claim, says: 'It seems difficult to deny that Great Britain may ground her refusal upon strict *law*, but it is equally difficult to deny, first, that in so doing she exercises harshly an extreme and hard law; secondly, that her conduct with respect to the navigation of the St. Lawrence is in glaring and discreditable inconsistency with her conduct with respect to the navigation of the Mississippi. On the ground that she possessed a small domain, in which the Mississippi took its rise, she insisted on the right to navigate the entire volume of its waters. On the ground that she possesses both banks of the St. Lawrence where it disembogues itself into the sea, she denies to the United States the right of navigation, though about one-half of the waters of Lakes Ontario, Erie, Huron, and Superior, and the whole of Lake Michigan, through which the river flows, are the property of the United States.'''

The doctrine of absolute sovereignty over a portion of a navigable river has always been rebutted and disputed in the United States, and during the infancy of our republic, and as early as the instructions given to Mr. Jay, our foreign minister, in 1780, and under the resolution of Congress of September, 1788, the United States claimed that the possession by Spain of the lower part of the Mississippi did not give it such exclusive sovereignty as that it could limit the riparian rights of the United States above it or the right of navigation below. And the continued assertion by the United States of its riparian rights as against Spain, although it conceded Spain to have the absolute sovereignty of the lower part of the Mississippi, led to a treaty in which the United States obtained the concessions she demanded. Upon this point we cite the following additional authorities: Wheaton's International Law, 3d ed., 242, 244, 247, 252; Show's Cases on International Law, sec. 8, pp. 32, *et seq.;* Opinion of Attorney-general of Pennsylvania, 4 Am. Law Reg. 385.

In the case at bar, however, we do not have to search the pages of history or of ancient law for international questions similar to the one presented in this cause. According to the testimony of Mr. Hall, a witness for the intervenor, the diversion of the waters of the Rio Grande in Mexico caused international complications between the United States and Mexico; an international boundary commission was appointed and has made an investigation and has filed its report. This report sustains the position taken by us in this case. According to the testimony of Mr. Newell, another witness introduced on behalf of the intervenor, the diversion of the water of Milk river in Canada, to the injury of citizens of Montana who had prior vested rights, has raised an international question between the United States and Canada, and that matter is now before the State De-

partments of these governments, and a commission has been appointed to make the proper and necessary investigations.

If all the principles of common law were waived or ignored, if all the principles of property rights were laid aside, upon the authorities cited in this section, and the commissions created for the disposition of international difficulties, the state of Kansas would have a right to recover in this action as against the state of Colorado and its citizens for the diversion of the waters of the Arkansas river in another and different jurisdiction. If Kansas and Colorado were in all respects independent nations, the diversion of the waters of the Arkansas river, as herein shown, would constitute a legitimate *casus belli*. The constitution of the United States has created this high tribunal not only a commission of arbitration, but has made it a court with full power to decree justice between the contending parties in this cause.

SEC. 36. The Conclusion of the Whole Matter.

In the foregoing sections of this brief we have not sought to overstate the injuries sustained by the complainant, the damages wrought, the interests affected, nor the vast territory involved in the issues of this case. The statements of fact have proceeded from the mouths of the sworn witnesses themselves. Nor is it necessary to enforce upon the attention of the court the tremendous and far-reaching consequences of any decision of this cause. The mere statement of the original issues as framed by the pleadings would strike the dullest ear and arrest the attention of the most careless hearer. These issues, vast as they were, have been immeasurably widened by the intervention of the United States, an intervention that we welcome on the part of the com-

plainant, whatever may be the intervenor's view of the law and the facts of this case.

The public interest in this case has deepened and broadened as its extent and far-reaching nature have become known. The mere statement of the parties and the novelty of the cause have struck the public imagination. The spectacle of two sovereign states, each with territories larger than many a kingdom of the old world, here peacefully contending with their suzerain in a tribunal of its own creation — a tribunal unsurpassed in its power and its lofty traditions of purity and learning — is one without a parallel, and has drawn to this great controversy an ever-increasing attention. We have sought to approach this discussion with a due appreciation of these things, with a due regard for the dignity of this court, and, while vigorously asserting our own rights as we conceive them, yet with a due consideration for the rights of others. Burke's boast of the common law was, that it protected alike and equally the English nobleman on the banks of the Thames and the humblest pariah on the banks of the Ganges. To that common law, the essence and sublimation of Anglo-Saxon law-giving for twenty generations, we here appeal, and upon its well-settled principles we rest our cause.

Respectfully submitted.

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